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JAN STACH

ON SOME MUSTELINAE FROM THE PLIOCENE BONE BRECCIA OF WĘŻE

Study on the Tertiary bone breccia fauna from Węże
near Działoszyn in Poland

PART X*

Abstract. — This paper describes the remains of skulls and mandibles of three species, namely *Mustela pliocaenica* n. sp., *Mustela plioerminea* n. sp. and *Martes wenzensis* n. sp. By their characteristic features all the three described species come very near to their Pleistocene representatives as well as to the living forms.

INTRODUCTION

Several interesting larger carnivores¹ have, so far, been described from the Pliocene bone breccia in Węże near Działoszyn (province of Łódź). The writer has now identified from the same breccia the remains of their smaller relatives from the mustelid group. They are: *Mustela pliocaenica* n. sp. and *Mustela plioerminea* n. sp. from the subfamily of Mustelinae Gill, also *Martes wenzensis* n. sp. from the subfamily Martinae Burmeister.

* Parts I-V — see *Acta Geol. Pol.*, vol. II-V/1952-55; parts VI-IX — *Acta Palaeont. Pol.*, vol. I-III, 1956-58.

¹ *Arctomeles pliocaenicus* n. gen. & n. sp. from the Melinae subfamily. *Acta Geol. Pol.*, vol. II/1951. — *Ursus wenzensis*, new species of a small Pliocene bear. *Ibid.*, vol. III/195. — *Nyctereutes* (Canidae) in the Pliocene of Poland. *Ibid.*, vol. IV, 1954. — *Agriotherium intermedium* n. sp. from the Pliocene bone breccia of Węże. *Acta Palaeont. Pol.*, vol. II/1957.

DESCRIPTION

Mustela pliocaenica n. sp.

(pl. I, fig. 1-5; text-fig. 1)

The material on which this species has been established consists of a skull lacking the mandible, and of four mandibular fragments belonging to various individuals.

The skull is with the occipital part damaged and the zygomatic arches missing; the upper carnassial (P^4) and the first molar (M^1) represent the right side dentition, while the left side is represented by a fragmentary premolar (P^4) and a well preserved first molar (M^1).

Of the four detached mandibles, the first is a fragmentary left ramus (pl. I, fig. 2) in which the incisors and the canine are missing from the anterior portion, while M_2 and all the processes are absent from the posterior part.

The second specimen is likewise a fragmentary mandibular ramus with the anterior and posterior ends damaged, and P_3 as well as M_2 absent.

The third specimen represents the right mandibular ramus with the lower carnassial; the fourth one is a fragmentary left ramus of the anterior part of the mandible, with only the second premolar (P_2) and a small portion of the canine present.

Fossil finds of small sized weasels from Pliocene and Pleistocene beds have frequently been reported. On the close resemblance of the discovered fragments to analogous skeletal elements in the living weasel, *Mustela nivalis* L., they have, in most cases, been assigned to that species (Boule, 1910; Stehlin, 1923; Osborn, 1927; Heller, 1930; Pasa, 1947, et alii).

A detailed description of fossil mustelid remains collected in 1934, in Hungary was undertaken by Kormos. He had the opportunity to study adequately five fossil mandibles belonging to a small sized weasel which had been recovered from the hill of Nagyhársány near Villány (province Baranyi in Hungary), also a mandible from the Sackdilling cave in the Frankonian Jurassic. The mustelid remains recovered from the latter locality had previously been studied by Fl. Heller in 1930. He identified it as *Mustela vulgaris* Briss. (= *Mustela nivalis* L.).

When comparing the mandibles of fossil weasels with that of the living *Mustela nivalis*, Kormos emphasized several structural differences on which he established a new species, i. e. *Mustela praenivalis* Kormos, to accomodate the Pleistocene weasel.

According to that author, the differences between *Mustela praenivalis* Kormos and *M. nivalis* L. are as follows:

1. The posterior boundary of the masseteric fossa in *Mustela praenivalis* Kormos is more rounded and not so far anteriorly pushed as in

Mustela nivalis L., where it often extends below the talonid of M_1 , terminating in an acute angle.

2. Below the protoconid of M_1 (lower carnassial) a circular depression occurs labially; in *Mustela nivalis* L. this is either absent or very faintly indicated.

3. A very characteristic feature of *Mustela praeivalis* Kormos is the mandibular body, constantly growing stouter, higher and thicker. Lingually it displays ridge-like thickenings along a number of teeth, while elongate depressions occur below it. In *Mustela nivalis* L. the surface of the mandibular body is as a rule quite uniform lingually.

4. The height of the mandibular body measured lingually below the first molar is 2.5 mm in the Sackdilling specimen against 2.65—3.0 mm in the Nagyhársány specimens, with thickness 1.5 to 1.8 mm. In specimens of *M. nivalis* L. the height thus measured ranges from 1.85 to 2.6 mm, the thickness is 1.15 to 1.6 mm (see Table 1).

5. The lower carnassial (M_1) is slightly larger in the fossil weasel than in *Mustela nivalis* L. where it very rarely attains the length figure noted in the fossil form (see Table 1).

Moreover, Kormos reports differences in mandibles of these mustelid species. In *Mustela praeivalis* Kormos the articular process is longer, the attachment of the external pterygoid muscle more distinctly indicated.

Upon closer investigation of the mandibular features in *Mustela praeivalis* Korm., as specified by Kormos, and their comparison with the corresponding characters of Węże mandibles and those of *Mustela nivalis* L., the following observations have been made:

Ad 1. The masseteric fossa in the Węże mandibles is anteriorly rounded, centrally deep. Anteriorly it reaches to a vertical line, drawn downwards from the point of contact between the protoconid and the talonid in M_1 ; thus in all of the Węże specimens it is seen to be pushed farther anteriorly than in *Mustela praeivalis* Kormos.

In specimens of *Mustela nivalis* L. from the vicinity of Kraków (south Poland) and the province of Polesie (White Russia), the anterior end of the masseteric fossa stretches equally far, i. e. to a vertical line, drawn downwards from the point of contact between the protoconid and the talonid in M_1 ; it is also similarly rounded, but never attains the width of that element noted in the Węże weasel.

Ad 2. A depression occurs below the protoconid of M_1 on the mandibles of the Węże specimens, which is neither deep nor sharply delimited from the remaining surface of the mandibular body, but somewhat expanded anteriorly and posteriorly. In shape it does not differ from the depression readily here discernible in specimens of the living weasel from the vicinity of Kraków and Polesie, which have been studied by the writer.

Ad 3. The lingual thickening of the mandibular body below a row of teeth, and the underlying depression, are faintly indicated in the Weże specimens. They are likewise indistinct in specimens of *Mustela nivalis* L. studied by the writer.

Ad 4. In all the Weże specimens the mandibular body is strong, high and thick. The height and thickness dimensions here exceed those asserted by Kormos for *Mustela praeivalis* Kormos, also those of the living *Mustela nivalis* L. (see Table 1).

Ad 5. The length of the first molar (M_1) is greater than that in *Mustela praeivalis* Kormos, being 4.8 to 5.5 mm against 3.0-4.1 mm in the latter form.

The length, width and height figures of P_2 and P_3 are higher for the Weże weasel (see Table 1).

Among the less significant details, we may note in the Weże specimens that, of the two usually present mental foramens, the anterior one is distinctly larger and occasionally subdivided into two smaller ones, so that three mental foramens are anteriorly observable in the mandible.

Neither Heller nor Kormos have had the opportunity to examine the skull of *Mustela praeivalis* Korm. The skull of a small weasel has, however, been discovered in the Weże breccia. Although its mandible is missing, yet the dimensions of the four above described mandibular fragments from the same breccia suggest that they belong to weasels of similarly small size (see Table 2).

In section this skull slopes gently anteriorly from the frontals, while posteriorly it rises gently too, displaying a very slight depression at midlength. Viewed from above the skull tapers towards the front from the papillar processes, hence the brain case is ovate, elongated. Above the canines the skull is anteriorly somewhat narrower than in the post-orbital area. In the mastoidal area cranial width is less than the distance from the posterior margin of the occipital foramen to the internal nares. All the crests are clearly indicated on the skull surface: the external frontal, the sagittal and the lambdoid of the occipital bone. The auditory bullae moderately inflated and almost of uniform height and width throughout their length. This is nearly double the width: 1.8:1.0. Anteriorly the auditory bullae are bluntly transversely truncated and separated from the pterygoidal processes (hamuli) by a relatively broad free space. Posteriorly they are rounded. The orientation of the auditory bullae is mutually parallel so that their anterior distance is the same as the posterior. The osseous surface between the auditory bullae is nearly flat, with only a slight longitudinal median elevation.

On the whole, the shape of the skull and of its diverse elements closely resembles that observed in the living weasel *Mustela nivalis* L.

T a b l e 1
Measurements of teeth and mandibles (in mm)

Specimens→	<i>Mustela pliocaenica</i> n.sp. Węże, Poland				<i>M. praenivalis</i> Korm.			<i>M. nivalis</i> L.	
	I	II	III	IV	Kormos, 1934, Hun- gary	Heller, 1930 Sackdilling, Germany	Heller, 1958 Erpfingen, Germany	Kraków, south Poland	Polesie, White Russia
P ₁ longitudo	1.30	1.70	—	—	1.10 1.30	—	—	1.30	1.00
latitudo	0.80	0.87	—	—	0.75 0.85	—	—	0.50	0.80
altitudo	0.60	0.60	—	—	—	—	—	0.67	0.70
P ₂ longitudo	2.00	2.00	—	2.20	1.60 1.70	—	—	1.40	1.75
latitudo	1.13	1.00	—	1.30	0.80 0.85	—	—	0.73	0.90
altitudo	1.50	1.20	—	1.30	—	—	—	1.00	0.80
P ₃ longitudo	2.80	—	—	—	1.85 2.15	—	—	2.10	2.20
latitudo	1.08	—	—	—	0.95 1.10	—	—	1.06	1.00
altitudo	1.90	—	—	—	—	—	—	1.60	1.70
M ₁ longitudo (carn.)	5.50	4.80	5.10	—	3.40 4.00	3.90 4.00	3.60 4.10	4.33	4.30 4.60
latitudo	1.80	1.60	1.60	—	1.05 1.20	—	1.00 1.30	1.13	1.30 1.60
altitudo	2.30	2.10	2.10	—	—	—	—	1.93	2.00 2.40
P ₁ — M ₂ longitudo	13.00	11.40	—	—	—	8.50	—	8.80	10.20 10.40
Altitudo mandibulae	4.30	3.80	3.70	4.20	2.50 3.00	2.50	2.70	1.85	3.16 3.20
latitudo mandibulae	2.30	2.00	1.90	2.10	1.50 1.80	—	1.40	1.15	2.00 2.20

T a b l e 2
Measurements of skulls (in mm)

Specimens→	<i>Mustela pliocaenica</i> Weże Poland	<i>M. nivalis</i> L. Poland	<i>M. nivalis</i> L. central Europe*	<i>M. nivalis</i> <i>boccamela</i> Bechst. Italy, south France*
Longitudo condylobasalis a — a**	47.0	34.8—41.8	♀ 30.0—36.4 ♂ 36.2—42.0	♀ 34.2—36.6 ♂ 37.4—46.6
Longitudo basalis b — b	41.0	31.0—38.2	—	—
Long. bullae tympanicae	14.5	11.25—13.0	—	—
Latit. maxim. bull. tympan.	8.2	6.5—7.9	—	—
Long. palati partis d — d	14.7	9.0—11.0	—	—
Latit. palati inter M ¹ —M ¹ e—e	5.0	4.5—6.2	—	—
Long. dentium I ¹ —M ¹ c — c	15.0	11.0—12.0	—	—
Longitudo P ⁴ (carnas.)	5.0	4.0—4.4	—	—
Longitudo M ¹	3.4	3.0—3.2	—	—
Latit. posterior. partis M ¹	2.0	1.45—1.9	—	—

* According to Miller (1912).

** For particular indices — see fig. 1 on p. 107.

The only notable difference consists in greater cranial length of the fossil form, due to greater elongation of muzzle. This is clearly shown by the length ratio of that part of the palate which is enclosed by the hind walls of the incisors and a straight horizontal line drawn from the posterior margin of the molars to the distance between the lingual ends of these teeth (fig. 1 *d-d*, *e-e*). In the Weże skull this ratio is 14.7 : 5.0, i. e. nearly three to one, while in skulls of *Mustela nivalis* L. examined by the writer the respective figures are 9-11 : 4.5-6.2, i. e. 1.6 to 2.0 (see Table 2).

The condylo-basal length in the skull of the Weże weasel is 47 mm. This exceeds Miller's figure ascertained for European specimens of *Mustela nivalis* L., and for its larger southern races: *Mustela nivalis boccamela* Bechstein and the Spanish *Mustela nivalis iberica* Barrot-Hamilton.

A noteworthy though not highly important difference lies in that the first upper molar of the Weże specimen is differently placed in relation to the carnassial P⁴. In the Weże weasel it is distinctly oblique, in the living *Mustela nivalis* L. almost vertical. Hence results the nearly right angle between P⁴ and M¹ in the Weże weasel and the strongly acute angle in the living form.

The broad lingual portion of the above molar also has a slightly different appearance. In the Węże weasel it bears distinct minute cusps on the tooth cingulum with rays radiating from the protocone towards these tiny cusps.

In view of all the evidence provided by a thorough examination of the described fragmentary skulls belonging to the Węże weasel, it may reasonably be inferred that similarities between that fossil weasel and the living *Mustela nivalis* L. are only moderate. It is not impossible that, in the absence of more diagnostic differences in other skeletal elements of these weasels and provided their occurrence is not separated by long spans of geological time, they may be identified as subspecies of *M. nivalis* L.

Differences observed between the Węże weasel and *Mustela prae-nivalis* Korm., a Pleistocene form from Hungary and Germany studied by Heller and Kormos, are likewise of minor significance.

The living weasel is separated from the Pleistocene form and from the Pliocene Węże specimen, if not by geographical distance, in any case by great span of time. This will be most conveniently stressed by giving the oldest form of these three, here described, the name of *Mustela pliocaenica* n. sp.

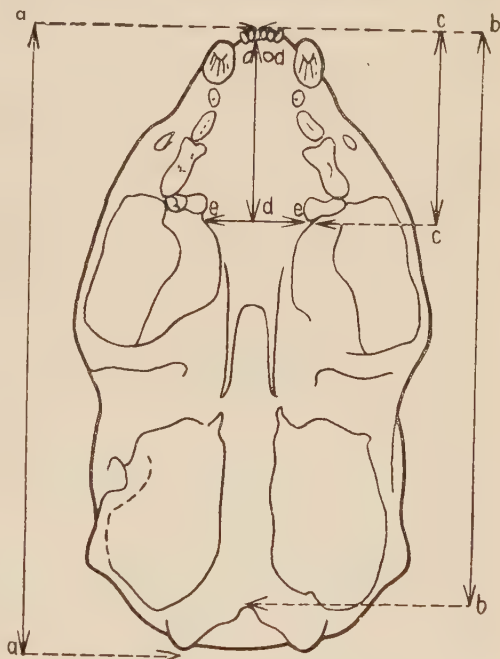


Fig. 1. Measurements of skull of *Mustela*
a-a basioccipital length, b-b basal length, c-c
length of tooth-row, d-d length of anterior
part of palate, e-e distance between the inner
ends of M1.

Mustela plioerminea n. sp.

(pl. I, fig. 6)

An additional skull without the mandible, referable to another small mustelid species, has been recovered from the Węże bone breccia. It lacks the zygomatic arches, while the protruding ends of bones are worn or damaged. Dentition: incisors missing, crowns of canines broken off at the base; in the left half premolars have been preserved as well as remnants of the first upper molar; in the right half remnants of premolars and a complete molar.

The skull is elongate, gradually tapering anteriorly from the mastoidal processes. In section the highest elevation occurs near the occipital bones, very gently sloping anteriorly towards the muzzle, posteriorly somewhat more steeply. The slight doming of the frontal bone, noted in the skull of the living *M. erminea* L. is here unknown. Anteriorly, in the area overlying the canines, the skull is nearly as broad as in the postorbital area. The cranial width in the mastoidal area is distinctly smaller than the distance of the posterior margin of the occipital foramen from the internal nares. The cranial crests are worn. The auditory bullae moderately inflated, more or less bean-shaped owing to the slight expansion directly behind the auditory foramen, i. e. approximately at midlength, similarly as in *Mustela erminea* L. The length ratio of the auditory bulla to its maximum width is 1.5 to 1.0. The auditory bullae are anteriorly very bluntly truncated, posteriorly rounded. They are mutually divergent so that the 4.5 mm distance separating their anterior ends is hardly one half that between their posterior ends (9.2 mm). The osseous surface enclosed by the auditory bullae is centrally somewhat elevated, particularly so posteriorly.

The general appearance and dimensions of the skull and its several elements resembles those characterizing the skull of the living *Mustela erminea* L. (see Table 3). The condylo-basal length is, however, greater in the Węże weasel. In the various European *M. erminea* L. races the condylo-basal length ranges from 40 to 48 mm, the length of 52.4 mm being attained only very exceptionally by a male individual of the British *Mustela erminea stabilis* Barret & Hamilton. The length of the skull near the muzzle is greater in the Węże weasel than in Polish specimens of the *M. erminea* examined by the present writer, as is also the length of several teeth, hence of the whole tooth-row. As has been afore said, there also occurs a notable difference between the anterior and the posterior divergence ratio of the auditory bullae in the Węże weasel as compared with the living *M. erminea* L.

The fossil remains of a weasel of the type of the living *M. erminea* L. are frequently encountered in deposits of early and later Pleistocene age.

In 1864, on evidence of similar fossils, i. e. a fragmentary mandible recovered from the Pleistocene strata of Beremend in Hungary, Petényi established a new fossil species of weasels: *Foetorius palermineus* Petényi.

In 1930, Heller referred to the same species *Mustela palermineus* (Petényi), a mandibular fragment collected from the Sackdilling cave of the Frankonian Jurassic, and again, subsequently, in 1958, from Erpfingen (Schwäbische Alb) which may be dated almost analogously as the Hungarian species.

Table 3
Measurements of skulls (in mm)

Specimens →	<i>Mustela plioerminea</i> Węże Poland	<i>Mustela erminea</i> Poland	<i>Mustela erminea</i> L. (according to Miller)	
			♀	♂
Longitudo condylobasalis a — a*	52.5	43.4-47.0	41.6-45.0	41.6-51.2
Longitudo basalis b — b	49.3	39.2-42.0	—	—
Long. bullae tympanicae	15.7	13.7-14.0	—	—
Latit. max. bullae tympanicae	9.6	8.2-8.9	—	—
Long. palati partis d — d	16.0	12.5-13.2	—	—
Latit. palati inter M ¹ -M ¹ e — e	6.8	6.5-7.2	—	—
Long. dentium I ¹ -M ¹ c — c	18.0	14.5-16.5	10.8-12.0	12.2-13.8
P ¹ longitudo	2.3	1.0-1.5	—	—
latitudo	1.5	1.0	—	—
altitudo	1.5	1.0-2.0	—	—
P ² longitudo	3.0	2.2-2.6	—	—
latitudo	1.8	1.0-1.3	—	—
altitudo	2.0	2.0	—	—
P ³ (carn.) longitudo	5.8	4.8-4.9	—	—
(front.) latitudo	3.0	2.5	—	—
altitudo	3.5	2.5-3.0	—	—
M ¹ longitudo	4.5	4.0	—	—
latitudo	3.0	2.0-2.2	—	—

* For particular indices — see fig. 1 on p. 107.

In 1934, Kormos had the opportunity to thoroughly examine a great number of mandibles belonging to the same species, collected from beds of Nagyhársány, Csarnóta and Pilisszántó in Hungary. On this material he demonstrated certain differences in shape and size of mandibular teeth belonging to *Mustela palerminea* (Petényi) and its subspecies *Mustela palerminea praeglacialis* (Kormos), as compared with *M. erminea* L. mandibles, abundant in later Pleistocene strata of Hungary.

Moreover this species is reported by Kretzoi (1938) from other localities of Hungary. Brunner (1952) reports them from the Pottenstein cave (Oberfranken) in strata assigned by him to the close of the Mindel glaciation or to the beginning of the Riss.

Mandibular fragments belonging solely to the above considered species were available to all these palaeontologists. Lack of the lower jaw in the skull of the Węże weasel does not, unfortunately, permit a comparison

of that weasel with the Pleistocene *Mustela palerminea* (Petényi). We may only venture the suggestion that certain differences existed between the Pliocene *M. plioerminea* n. sp. from Węże and the Pleistocene *M. palerminea* (Petényi), similarly as between the weasel *M. pliocaenica* n. sp. and the Pleistocene *M. praenivalis* Kormos. The name of *M. plioerminea* n. sp. is, therefore, analogously proposed by the present writer for the Pliocene, pseudo-ermine form from Węże. This name would suggest that in appearance the skull of this Pliocene form comes near to the type of the living *M. erminea* L. though they are separated by a long span of geological time.

Martes wenzensis n. sp.

(pl. II, fig. 1-4)

In addition to small mustelid remains, the Węże breccia has also yielded some skeletal fragments belonging to larger sized species from the group *Martinae* Burm. These fossils consist of a relatively well preserved skull (pl. II, fig. 4) together with a closely adjoining mandible. The zygomatic arches are missing, as well as the upper mandibular branches; the osseous cover and the dentition are partly damaged. For the purpose of description the lack of some parts of dentition in this skull may be supplemented by data provided by the examination of the anterior portion of skull belonging to another specimen, also the fragmentary mandible of a third individual.

The shape of skull differs somewhat from the cranial type noted in the living *Martes martes* L. In the living *Martes* the apical point of the cranial elevation occurs on the occipital bones, approximately coinciding with the vertical line drawn into the auditory foramen area; from there the roof of the skull gently descends to the nasal foramen, depressing in its course only where the cerebral area passes into the facial. In the Węże skull, the apex of the cranial elevation occurs about midlength. From that point it descends in an arch, uniformly domed both towards the nasal foramen and to the rear of skull. Viewed from above the cranial width is seen to decrease anteriorly from its maximum about the auditory bullae. Measured above the canines the width is less than half that measured near the auditory bullae. Near the muzzle cranial width is distinctly smaller than in the postorbital area. The postorbital processes are short, the semicircular lines of the frontal bones radiating from them converge far posteriorly at an acute angle, and unite with the sagittal crest of moderate height. The supra-occipital crests are developed similarly as in the living *Martes*. In shape the auditory bullae resemble those in the

living form, i. e. they are relatively broad, moderately inflated, with a slight depression stretching approximately in the centre along the entire length, so as to separate the swollen internal part from the external which is flatter. The length/width ratio in the auditory bullae is close to that noted in the living *Martes*, the figures being 1.5 and 1.32—1.38 respectively. The auditory bullae are mutually placed so that their posterior divergence is slightly greater than in the living *Martes*. A conspicuous central elevation occurs on the surface of the basi-occipital part. The palate is moderately broad, its *d-d* to *e-e* length ratio, i. e. covering the distance between the molars, is 3 : 1 (see fig. 1).

Dentition. Strongly damaged anterior portion of both jaws do not permit a description of the incisors and canines. Both, the mandibular and the maxillary first molar are missing, but their alveoles suggest that they were extremely small, one-rooted, tightly squeezed in between the canine and the second premolar. The shape of the remaining premolars and of the maxillary molar resembles that typical of the living *Martes*, except that in the Weze marten, all the teeth are distinctly longer at the base, and stouter. P^2 is shaped like a nearly regular high-topped triangle. P^3 is slightly more elongate posteriorly where its sharp edge descends from the apex downwards. The upper carnassial is much longer and stouter than that in the living *Martes*. It has a low protocone, a high strong paracone with a sharp cutting edge extending to the metacone. The molar is longer too, with a part of the external tubercles relatively high, descending to the expanded lingual portion of the crown.

The mandible is stout, 2.5 mm higher than in the living *Martes*, in shape of teeth resembling the living form. The preserved alveole of the first premolar indicates that it was small, one-rooted, tightly squeezed in between the canine and the second premolar. P_2 is posteriorly elongate. A slight tubercle-like doming is present in P_3 on the posterior margin descending from the top of the tooth. In P_4 this doming grows into a distinct cusp, pushed out towards the cheek. The lower carnassial is stout, with a high protoconid, a relatively low paraconid, strong metaconid, and a low, rather flat talonid. The complete length of that tooth-row is greater than the corresponding element in the mandible of the living *Martes*.

A summary of the above mentioned observations concerning the fossil remains of the Weze marten and their comparison with the corresponding skeletal parts in the living *Martes* indicate that the fundamental differences between these forms consist solely in the greater dimensions of the complete skull and of its particular elements in the fossil species, though these two forms are separated by a long span of geological time.

Fossil remains of martens belonging to those remote periods are frequently encountered beginning with Miocene beds. However, a great number of their species have been created on very fragmentary material, not diagnostic enough.

Sufficiently copious material was, however, available to Zdansky, for *Mustela palaeosinensis* Zdansky, 1924. The remains of that marten had been discovered among a fossil fauna of carnivores from the territory of the present province of Schan-shi in north-eastern China, which he was then investigating. The majority of material examined by Zdansky was collected from strata containing a well preserved Hipparion-fauna, some of it, however, though found in China, is stated to be of "unbekannter Herkunft und unbekannter Alters".

The skulls of *Mustela palaeosinensis*, examined by Zdansky, differed in certain details of shape and size. Taking, however, into account the possibility of strong variations of this fossil marten, they were all regarded by that author as conspecific.

The fossil remains of the Węże marten display close similarities with the Chinese *Martes palaeosinensis* (Zdansky). Differences in the size and shape of teeth are unimportant, the average figures in *M. palaeosinensis* being only slightly higher, as is shown in a dimension chart given in tables 4 and 5.

Some differences, however, may be noted here, too. In all the examined Węże specimens the first premolar was functional in both jaws, while in *M. palaeosinensis* this tooth is unknown, with the exception of one mandibular specimen only. No traces of cusp can be detected on the posterior margin of the third mandibular premolar in the Chinese specimens. In P_4 the cusp on the posterior margin is stronger in martens from China than in that from Węże, being at the same time pushed farther towards the apex of the crown. In the lower carnassial the protoconid is rectilinearly triangular in the Węże specimen, while in the Chinese marten the paraconid is higher, typically carnassial. In *M. palaeosinensis* the maxillary first molar (M^1) is shorter and more massive, in section more broadly elliptical.

Other fossil martens are of similar size as the Węże specimen, e. g. *Mustela pentelici* Gaudry, 1861, so far known on one mandibular ramus collected from Pikermi, also *Martes woodwardi* Pilgrim, 1931, a species established on a single mandibular fragment, likewise recovered from Pikermi, and *Mustela leporinum* Khomenko, 1914, from Tarakla in Rumania. Teeth, similar in shape, have also been encountered in martens of considerably smaller size, such as *Martes laevidens* Dehm, 1950, from the Middle Miocene (Burdigalian) in Eichstätt (Bavaria), or *Mustela anderssoni* Schlosser, 1924, from the Hipparion-fauna of Mongolia, etc.

Table 4 — Measurements of skulls (in mm)

Cranium et maxilla	<i>Martes wenzensis</i> n.sp.		<i>Martes palaeosinensis</i> (Zdansky) China							<i>Martes martes</i> L. Poland				<i>Martes martes</i> L. (according to Miller)	
	I	II	I	II	III	IV	V	VI	VII	I	II	III	IV	♀	♂
Long. condylo- basalis	—	91.0	—	—	—	—	—	—	—	73.5	73.2	81.6	76.5	77.0-80.0	79.0-88.0
Long. basalis	—	85.5	—	—	—	—	—	—	—	70.3	68.2	75.0	71.7	—	—
Latit. mastoidalis	—	40.0	—	—	—	—	—	—	—	34.5	34.4	37.0	35.4	36.0-39.4	37.4-42.2
Latitudo	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
postorbitalis	—	23.3	—	—	—	—	—	—	—	19.6	17.7	19.4	20.0	19.6-21.8	19.2-23.2
Latit. frontalis	—	—	—	—	—	—	—	—	—	15.5	14.5	16.6	16.0	16.2-17.0	16.0-18.8
Longitudo	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
palatini d — d	38.0	—	—	—	—	—	—	—	—	30.0	28.5	32.5	30.5	—	—
Latitudo e — e	13.0	—	—	—	—	—	—	—	—	10.0	9.5	10.0	11.0	—	—
Longitudo	—	—	—	—	—	—	—	—	—	12.3	18.0	18.3	18.0	—	—
bullae ossae	—	21.0	—	—	—	—	—	—	—	13.0	13.0	13.3	13.7	—	—
Latitudo	—	14.0	—	—	—	—	—	—	—	8.0	7.5	8.5	9.7	—	—
bullae ossae	—	—	—	—	—	—	—	—	—	11.5	11.0	12.0	12.0	—	—
Latitudo	—	11.0	—	—	—	—	—	—	—	—	—	1.5	—	—	—
spat. poster.	—	17.0	—	—	—	—	—	—	—	—	—	2.0	—	—	—
P ¹ longitudo	—	—	2.1	2.0	2.2	2.2	1.8	2.1	—	—	—	3.0	—	—	—
latitudo	—	—	2.2	2.3	1.6	2.2	1.6	1.9	—	—	—	—	—	—	—
altitudo	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
P ² longitudo	5.8	—	5.7	5.5	5.7	5.1	4.2	4.5	—	4.1	3.8	4.1	4.0	—	—
latitudo	3.0	—	2.4	2.5	2.4	2.4	2.3	1.9	—	2.1	2.1	3.0	3.0	—	—
altitudo	3.6	—	—	—	—	—	—	—	—	3.5	3.1	3.5	3.0	—	—
P ³ longitudo	6.5	—	7.2	7.3	7.0	6.8	6.0	5.6	7.7	5.0	5.0	5.9	5.0	—	—
latitudo	3.0	—	3.5	3.7	3.3	3.4	2.8	2.6	3.7	2.9	2.5	3.0	2.3	—	—
altitudo	4.2	—	—	—	—	—	—	—	—	3.0	3.2	3.4	3.0	—	—
P ⁴ longitudo	12.0	—	11.3	11.4	10.0	10.3	9.3	9.0	11.5	8.5	8.0	7.9	7.8	8.2-9.0	8.8-9.6
(carn.) latitudo	5.2	—	6.7	6.5	6.4	5.9	5.7	4.6	6.7	5.1	5.0	5.6	5.5	5.2-5.4	6.0-6.8
altitudo	6.0	—	—	—	—	—	—	—	—	4.9	4.0	4.9	3.0	—	—
M ¹ longitudo	10.5	—	10.7	10.7	10.5	10.2	9.5	8.5	10.9	8.5	7.6	8.6	8.0	7.8-8.2	8.8-10.0
latitudo	6.6	—	6.7	7.2	6.9	6.7	5.9	5.2	7.6	6.0	5.0	6.5	4.5	4.6-6.0	4.4-7.2
altitudo	2.0	—	—	—	—	—	—	—	—	2.5	2.5	2.2	2.0	—	—
Longitudo	—	—	—	—	—	—	—	—	—	32.0	31.4	36.0	32.8	27.2-29.6	27.0-31.4
dent. I-M ¹	42.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 5
Measurements of mandibles (in mm)

Mandibula	<i>Martes wenzensis</i> n. sp.		<i>Martes palaeosinensis</i> (Zdansky) China				<i>M. pentelici</i> G. Pikermi	<i>M. leporinum</i> Khom. Romania	<i>M. laevidens</i> D. Bavaria	<i>Martes martes</i> L. Poland	
	I	II	I	II	III	IV				I	II
P ₁ longitudo	—	—	1.6	—	—	—	—	—	—	—	—
latitudo	—	—	1.6	—	—	—	—	—	—	—	—
altitudo	—	—	—	—	—	—	—	—	—	—	—
P ₂ longitudo	5.0	5.0	5.8	5.5	4.9	4.5	6.0	5.0	3.3	4.0	4.0
latitudo	2.5	2.3	2.7	2.7	2.5	2.0	—	—	—	2.7	2.8
altitudo	3.0	4.0	—	—	—	—	—	—	—	3.0	3.0
P ₃ longitudo	6.6	5.8	6.8	7.0	6.7	5.2	6.0	6.5	4.7	4.5	4.7
latitudo	3.0	2.8	3.2	3.1	2.9	2.4	—	—	—	3.0	2.0
altitudo	4.0	3.6	—	—	—	—	—	—	—	3.0	3.2
P ₄ longitudo	7.5	7.2	7.5	7.8	7.3	6.1	8.0	8.8	4.8-5.8	5.3	5.3
latitudo	3.6	3.0	3.8	3.8	3.3	2.7	—	—	—	3.0	3.0
altitudo	4.2	3.5	—	—	—	—	—	—	—	3.5	3.5
M ₁ longitudo	—	11.0	13.0	12.6	12.5	11.0	13.0	13.5	6.9-7.5	9.0	9.0
(carn.) latitudo	—	4.5	5.2	4.8	4.6	3.9	—	—	—	3.2	3.5
altitudo	—	4.5	—	—	—	—	—	—	—	4.5	4.6
M ₂ longitudo	—	—	4.8	5.0	4.3	—	4.0	—	3.4	—	—
latitudo	—	—	4.3	4.8	4.6	—	4.0	—	—	—	—
Altitudo mand.	11.2	10.0	—	—	—	—	—	—	—	7.5	7.5
Latitudo mandibulae	5.6	5.0	—	—	—	—	—	—	—	3.6	3.5
Long. dent. I-M ₂	—	35.0	—	—	—	—	—	—	—	29.4	26.0

The present writer believes that the Węże marten ought to be placed in a distinct species, as *Martes wenzensis* n. sp., stressing that, together with other better known species, it constitutes a group of martens of the type of *Martes palaeosinensis* (Zdansky), which is that most adequately known. The mentioned group existed in Eurasia during the Miocene/Pliocene boundary and also during the early Pleistocene, among the more or less impoverished Hipparion-fauna.

The new genus *Pliomartes* Kretzoi was in 1952 established by Kretzoi for *Mustela palaeosinensis* Zdansky, *Mustela pentelici* Gaudry and several others. According to Kretzoi, the characteristics of this genus are the presence of the first premolar, premolars elongate but low, mandible mostly very slender, and a tendency for the premolars to be broadly spaced.

According, however, to Kretzoi (*l. c.*, p. 15): "Martinen mit unreduzierter Bezahnung, wie wir sie heutzutage in *Martes* oder *Lamprogale* vor uns haben, sind aus den Hipparion-Faunen ganz unbekannt. Sämtliche Formen haben eine gewisse Reduktion, besonders was die P anbelangt, erlitten". Contrary to this, the first upper premolar was present in all the specimens of *Mustela palaeosinensis* Zdansky, in one specimen the first lower premolar too, and the species *M. palaeosinensis* Zdansky belongs to the Hipparion-fauna.

Zoological Institute
of the Polish Academy of Sciences
Cracow Branch
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REFERENCES

- BRUNNER, G. 1952. Die Markgrabenhöhle bei Pottenstein (Oberfranken). Eine Fauna des Altdiluviums mit *Talpa episcopalis* Kormos u. a. — *N. Jb. Geol. Paläont.*, **10**, 457-471, Stuttgart.
- DEHM, R. 1950. Die Raubtiere aus dem Mittel-Miocän (Burdigalium) von Wintershof-West bei Eichstätt in Bayern. — *Abh. Bayer. Akad. Wiss., Math.-naturw. Kl.*, N. F., **58**, 3-141, München.
- HELLER, F. 1930. Eine Forest-Bed-Fauna aus der Sackdillinger Höhle (Oberpfalz). — *N. Jb. Min. etc.*, Beil.-Bd. **63**, B, 247-298, München.
- 1958. Eine neue altquartäre Wirbeltierfauna von Erpfingen (Schwäbische Alb). — *N. Jb. Geol. Paläont.*, **107**, 1-102, Stuttgart.
- KHOMENKO, J. P. 1914. La faune méotique du village Taraklia du district Bendery. — *Trav. Soc. Nat. Bessarabia*, **5**, 1-55, Kišinev.
- KORMOS, T. 1914. Drei neue Raubtiere aus den Präglazial-Schichten des Somlyóhegy bei Püspökföld. — *Mitt. Jb. k. ungar. geol. Reichsanst.*, **22**, 3, 225-247, Budapest.
- 1934. Neue und wenig bekannte Musteliden aus dem ungarischen Oberpliozän. — *Folia Zool. Hydrobiol.*, **5**, 129-158, Riga.
- KRETZOI, M. 1937-38. Die Raubtiere von Gombaszög nebst einer Übersicht der Gesamtfauna. — *Ann. Musei Nation. Hungar.*, **31**, 88-157, Budapest.
- 1941. Die unterpleistozäne Säugetierfauna von Betfia bei Nagyvárad. — *Földt. Közl.*, **71**, 7/12, 308-335, Budapest.
- 1952. Die Raubtiere der Hipparionfauna von Polgárdi. — *Ann. Inst. Geol. Publ. Hungar.*, **49**, 3, 3-42, Budapest.
- MILLER, G. S. 1912. Catalogue of the Mammals of Western Europe. 1-1019, London.
- PETÉNYI, S. J. 1864. Hátrahagyott munkái. Magyar Tudamán. Akad., I Füz., 3-130, 44-47, Pest.
- PILGRIM, G. E. 1931. Catalogue of the Pontian Carnivora of Europe. 1-174. London.
- ZDANSKY, O. 1924. Jungtertiäre Carnivoren Chinas. — *Palaeont. Sinica*, C, **2**, 1, 1-149, Peking.

JAN STACH

O NIEKTÓRYCH ŁASICOWATYCH Z PLIOCEŃSKIEJ BREKCJI KOSTNEJ
Z WĘŻÓW

Streszczenie

Autor opisuje, na podstawie czaszek i szczęk wypreparowanych z plioceńskiej brekcji kostnej, znalezionej w miejscowości Węże koło Działoszyna, trzy nowe gatunki z rodziny Mustelidae, a mianowicie *Mustela pliocaenica*, *Mustela plioerminea* i *Martes wenzensis*.

Pierwszy z tych gatunków — *Mustela pliocaenica* — należał do grupy łasiczek o drobnych wymiarach ciała, a pod względem ogólnego kształtu czaszki i poszczególnych jej części zbliżał się bardzo do dzisiejszej łasiczki *Mustela nivalis* L. Wyraźniejsza różnica zaznacza się w większej długości czaszki łasiczki z Wężów, spowodowanej głównie znaczniejszym wydłużeniem się części pyszczkowej tego zwierzęcia. Niewielkie też różnice występują pomiędzy tą plioceńską łasiczką a *Mustela praenivalis* Kormos, opisaną przez Hellera i Kormosa z plejstocenu Niemiec i Węgier.

Drugi gatunek — *Mustela plioerminea* — większa od poprzedniej, typu dzisiejszego gronostaja *Mustela erminea* L., ma także pokrewną sobie formę w plejstocenie Węgier i Niemiec w postaci *Mustela palerminea* (Petényi). Także pomiędzy tymi trzema gatunkami nie zachodziły większe różnice w budowie części czaszki.

Z trzeciego gatunku — *Martes wenzensis* — znalazła się w brekcji czaszka niemal w całości zachowana (pl. II, fig. 4), nadto przednia część czaszki drugiego osobnika oraz pięknie zachowany fragment żuchwy. Kształtem i znaczniejszą wielkością czaszka z Wężów odbiega nieco od czaszki dzisiaj żyjącej kuny *Martes martes* L. Większa jest długość poszczególnych zębów i całego ich szeregu, znaczniejsza też wysokość i tęgość żuchwy, natomiast zasadniczy kształt zębów jest u obu tych gatunków kun podobny. Rozmiarami czaszki i zębów zbliża się kuna z Wężów do opisaney przez Zdansky'ego kuny *Martes palaeosinensis* (Zdansky) ze złóż z fauną hipparionową pñ.-wschodnich Chin.

Różnice pomiędzy wszystkimi powyżej wymienionymi formami, a odpowiadającymi im dzisiaj żyjącymi gatunkami są tak niewielkie, że gdyby nie oddzielał ich od siebie tak długi okres występowania ich w przyrodzie, można by je uważać za podgatunki żyjących dzisiaj form.

Podobieństwo ich ze sobą wskazuje na bardzo wczesne, bo już w miocenie, ustalenie pewnego zasadniczego typu w obrębie niektórych łasicowatych, tak trwałe, że typ ten nie uległ większym zmianom w przeciągu tak długiego okresu czasu.

OBJAŚNIENIA DO ILUSTRACJI

Fig. 1 (p. 107)

Pomiary czaszki *Mustela*: a-a długość podstawy potylicy, b-b długość podstawowa czaszki, c-c długość szeregu zębów, d-d długość przedniej części podniebienia, e-e odległość językowych brzegów M¹.

Pl. I

Mustela pliocaenica n. sp.

Fig. 1. Czaszka, a z boku, b od dołu; wielk. nat.

Fig. 2. Fragment żuchwy; $\times 2$.

Fig. 3. Fragment żuchwy, od przodu; $\times 4$.

Fig. 4. Fragment żuchwy; $\times 4$.

Fig. 5. Fragment żuchwy; $\times 4$.

Mustela plioerminea n. sp.

Fig. 6. Czaszka, a z boku, b od dołu; wielk. nat.

Pl. II

Martes wenzensis n. sp.

Fig. 1. Żuchwa (a, b) odpreparowana od okazu fig. 4 na tej planszy; wielk. nat.

Fig. 2. Fragment połowy żuchwy; $\times 2$.

Fig. 3. Fragment przodu czaszki; wielk. nat.

Fig. 4. Czaszka wraz z żuchwą, z boku; wielk. nat.

ЯН СТАХ

О НЕКОТОРЫХ КУНЬИХ ИЗ ПЛИОЦЕНОВОЙ КОСТНОЙ БРЕКЧИИ В МЕСТНОСТИ ВЕНЖЕ

Резюме

На основании черепов и челюстей отпрепарированных из плиоценовой костной брекчии, найденной в местности Венже близ Дзялошина, автор дает описание трех новых видов семейства Mustelidae, а именно *Mustela pliocaenica*, *Mustela plioerminea* и *Martes wenzensis*.

Первый из них — *Mustela pliocaenica* — принадлежал к небольшим ласкам и общей формой черепа и его отдельных частей очень близкий современной ласке *Mustela nivalis* L. Более отчетливое различие намечается в большей длине черепа ласки из местности Венже в связи с удлинением морды. Такие же небольшие различия между плиоценовой лаской и *Mustela praenivalis* Kormos, описанной Геллером и Кормошем (Heller и Kormos) из плейстоцена Германии и Венгрии.

Второй вид — *Mustela plioerminea* — больше чем предыдущий принадлежит к типу современного горностая *Mustela erminea* L. Родственной формой является тоже *Mustela palerminea* (Petényi) из плейстоцена Венгрии и Германии.

Также и эти три вида не обнаруживают какихнибудь более значительных различий в строении черепа.

С остатков третьего вида — *Martes wenzensis* — в брекчии найден почти полный череп (пл. II, фиг. 4), а кроме того передняя часть черепа другой особи и хорошо сохранившаяся часть нижней челюсти. Формой и большей величиной череп этот отличается несколько от черепа современной куницы *Martes martes* L. Нижняя челюсть выше и более массивная, а зубы и зубной ряд длинее у ископаемой куницы, но их форма в основном одинакова у обоих видов. Величиной черепа и зубов приближается куница из местности Венже к *Martes palaeosinensis* (Zdamsky) из отложений северо-восточного Китая с гиппарионовой фауной.

Различия между всеми выше упомянутыми формами и соответствующими им современными так небольшие, что если бы не разделяющий их значительный промежуток времени, можно бы их считать подвидами современных форм.

Это сходство указывает на очень раннее установление среди куньих некоего основного типа, который не подвергался изменению в течении так долгого времени.

EXPLANATIONS OF PLATES

Pl. I

Mustela pliocaenica n. sp.

- Fig. 1. Skull, *a* side view, *b* bottom view; nat. size.
 Fig. 2. Fragment of mandible; $\times 2$.
 Fig. 3. Fragment of mandible, anterior view; $\times 4$.
 Fig. 4. Fragment of mandible; $\times 4$.
 Fig. 5. Fragment of mandible; $\times 4$.

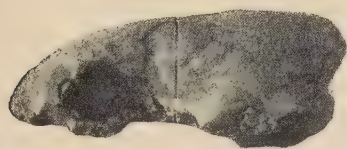
Mustela plioerminea n. sp.

- Fig. 6. Skull, *a* side view, *b* bottom view; nat. size.

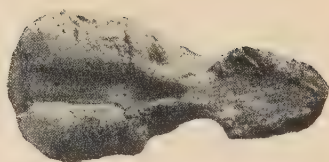
Pl. II

Martes wenzensis n. sp.

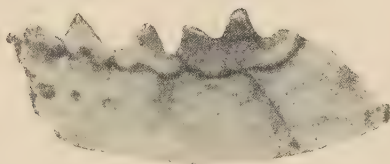
- Fig. 1. Mandible (*a*, *b*) detached from specimen fig. 4 of this plate; nat. size.
 Fig. 2. Fragment of half a mandible; $\times 2$.
 Fig. 3. Fragment of skull, anterior view; nat. size.
 Fig. 4. Skull with mandible, side view; nat. size.



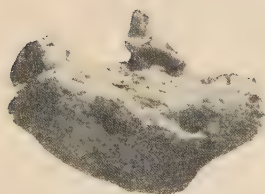
1 a



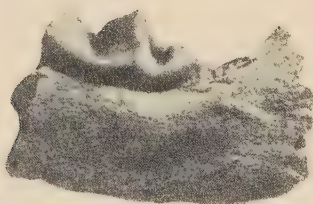
1 b



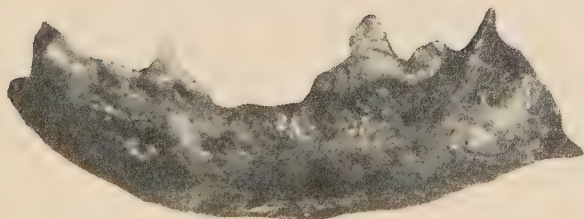
2



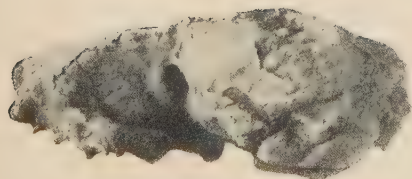
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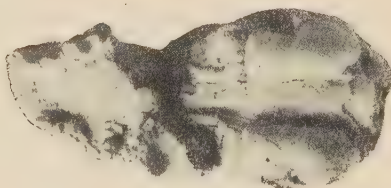
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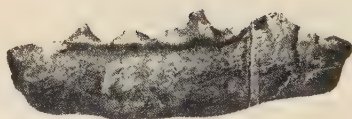
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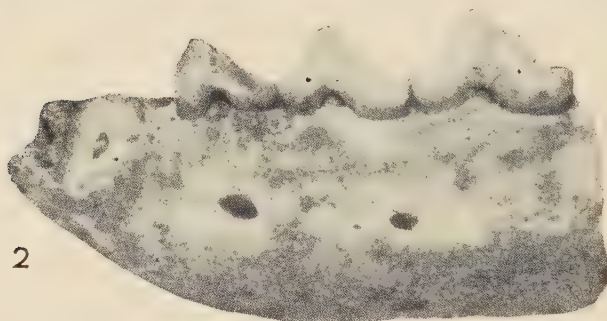
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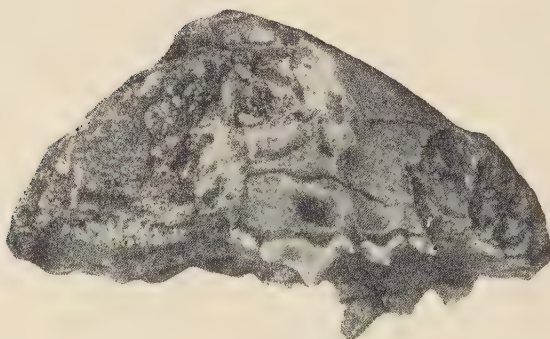
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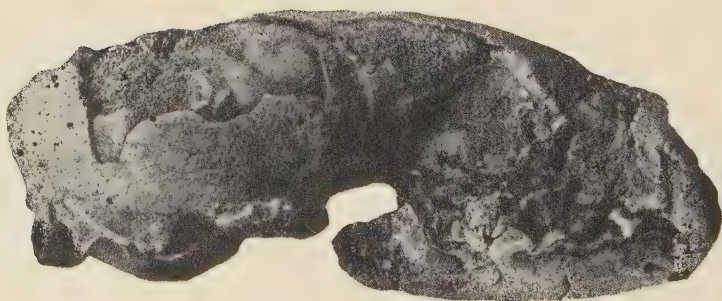
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ANDRZEJ SULIMSKI

PLIOCENE INSECTIVORES FROM WĘŻE

Study on the Tertiary bone breccia fauna from Węże
near Działoszyn in Poland

PART XI*

Abstract. — This paper contains a description of 18 insectivore species recovered from the bone breccia at Węże near Działoszyn (province of Łódź). The described forms include four new species and one new genus: *Erinaceus samsonowiczi* n. sp., *Blarinoides mariae* n. gen., n. sp., *Neomys soriculoides* n. sp., *Suncus zelceus* n. sp. The writer explains his methods of work and discusses the age and origin of the breccia, as well as the problem of the palaeogeographic distribution of some species found in the Węże bone breccia.

INTRODUCTION

The insectivore bone material entrusted to the writer to be described comes from the bone breccia discovered at the village of Węże near Działoszyn. Work on the preparation of this material has been carried out during the last three years in the Palaeozoological Laboratory of the Polish Academy of Sciences in Warsaw. It has been supplemented by material from the same locality, handed over to the writer in 1955 by the late Professor E. Wilkus of Lublin University, also by that prepared in the Department of Palaeozoology of the Wrocław Institute of Zoology.

The writer's most sincere thanks are here conveyed to Professor Roman Kozłowski for his valuable advice and suggestions throughout the preparation of this paper, also for his critical comments after its completion; to Professor Jan Samsonowicz for reading through the chapter

* Parts I-V — see *Acta Geol. Pol.*, vol. II-V/1952-55; parts VI-X — *Acta Palaeont. Pol.*, vol. I-IV/1956-59.

concerned with the stratigraphy and origin of the Węże breccia; to Professor Zbigniew Ryzewicz and his co-workers in Wrocław for help in providing supplementary materials and information about new finds in Węże; to Professor August Dehnel for the permission to examine the rich Białowieża collection of recent shrews, and for discussing many variation problems in this animal group; to Professor Claude W. Hibbard of the Michigan University for the generous gift of comparative material consisting of recent and fossil American shrews, also for his valuable comments on the new species and genus *Blarinoides mariae*. The author expresses his sincere gratitude to Prof. A. Halicka, Director of Museum of the Earth in Warsaw, for the loan of material for investigations.

Warmest thanks are also due to Dr. K. Kowalski for suggestions concerning fossil insectivores and for the access to his rich library in Kraków; to Dr. W. Serafiński for kindly lending comparative materials of recent hedgehogs; to Dr. J. Kulczycki for help in analysing problems of dental terminology and structure of cranial and mandibular elements, as well as for providing the missing literature items; to Mrs. J. Humnicka for doing the English translation of the paper, and finally to Miss M. Czarnecka for the photography.

CONDITIONS OF THE DEPOSIT

The bone breccia from which so many insectivore remains have been recovered comes from a karst doline in the side of a hill, called Zelce, at the village Węże near Działoszyn. This is the northernmost point of the Kraków—Wieluń Jurassic Highlands. Papers by J. Samsonowicz (1934) and K. Kowalski (1951) give a detailed geological description, section of the karst doline with the breccia, and topography of the neighbourhood of the Zelce hill.

The karst doline with Tertiary fauna, about 4 m in depth and 5-6 m in diameter, was filled in by layers of two types: red beds with a large admixture of weathered clay and bean ore (terra rossa), and light beds, the so-called "grey" breccia, strongly calcified. These beds, about 0.5 to 1.6 m in thickness, were repeated alternately. The upper part of the doline was filled by cinereous soil and about 1 m of calcareous rock debris containing a mixed Plio-Pleistocene fauna. The lower portion consisted of thin lenticular, red and "grey" breccia beds, and of barren beds of limestone crust and calcite. The bottom breccia layer, probably of red colouration, rested directly on Jurassic limestone (section fig. 1).

The bulk of the breccia (ca. 11 tons), excavated in 1933 by Professor Samsonowicz, is now deposited in the Muzeum Ziemi (Museum of the Earth) in Warsaw. The materials, at first systematically sorted and stored

under the guidance of Professor Samsonowicz, are now badly mixed up, owing to conditions prevailing during the war and immediately after it. The remainder of the Węże breccia was excavated in 1955, and deposited in the Institute of Palaeozoology in Wrocław.

A part of carnivorous remains yielded by the Węże breccia have been worked out by J. Stach (1951, 1952, 1954, 1957), those of reptiles — by

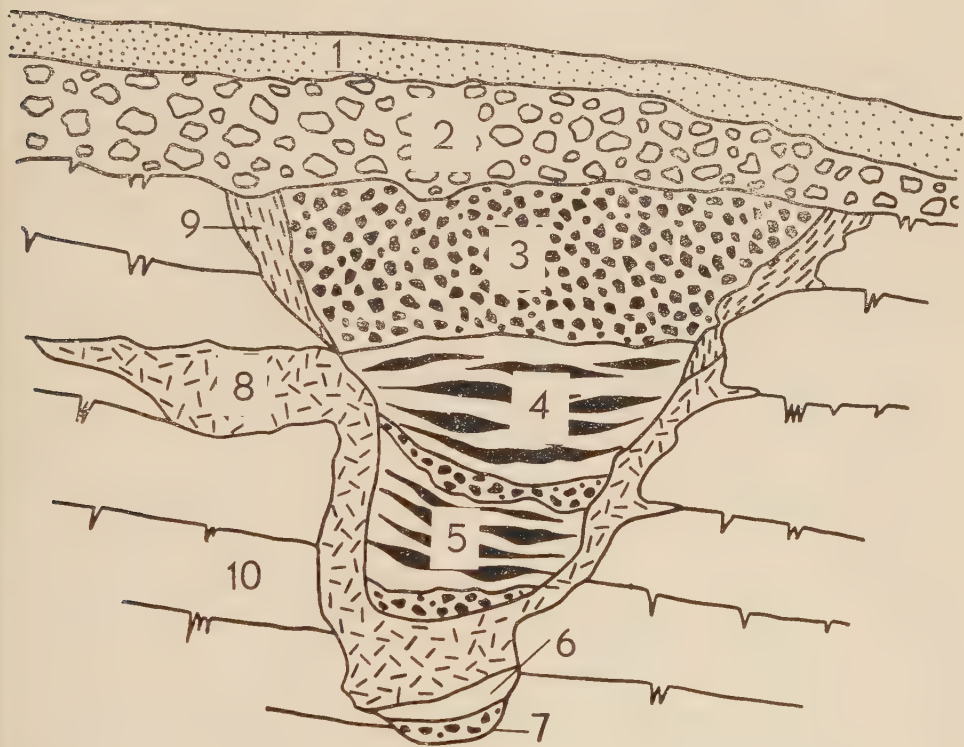


Fig. 1. — Longitudinal section of karst doline with bone breccia (after J. Samsonowicz, 1934)

1 soil, 2 limestone debris, 3 red breccia with bean ore (terra rossa), 4 & 5 "grey" breccia, between "grey" breccia beds thin lenticular red breccia layers, 6 pinkish-yellowish calcareous crust, 7 red clay with bone breccia and bean ore, 8 calcite, 9 limestone incrustations and calcite, 10 Jurassic limestone.

M. Młynarski (1953, 1955, 1956), while T. Czyżewska has published note on some ungulate (1958). The remaining mammalian fauna, including insectivores and rodents, is being worked out in Warsaw, the other ungulates — in Wrocław. Studies on carnivores and bats are carried on in the Zoological Institute of the Polish Academy of Sciences in Kraków.

AGE OF THE WĘŻE BRECCIA

The first geological investigations of the Węże breccia (Samsonowicz, 1934) have shown the occurrence there of a nearly complete Pliocene section. The lower beds of the breccia have been dated as Lower Pliocene, perhaps the Upper Miocene; the upper beds weathered and calciferous rock debris — as Upper Pliocene, possibly as early Pleistocene.

The supposition of Samsonowicz (*l. c.*) are, on the whole confirmed by later, palaeontological investigations. The carnivorous *Arctomeles pliocaenicus* Stach is never recorded from the Miocene. Stach (1951) believes that form to have become extinct at the close of the Pliocene owing to the cooling down of climate. The small bear *Ursus wenzensis* Stach, 1952 has been referred to the Middle or Lower Pliocene, while the position of *Nyctereutes* sp. (Stach, 1954) has likewise been placed in the Pliocene. Finally, *Agriotherium intermedium* Stach, 1957 must have lived from the Upper Miocene to the Upper Pliocene. Studies on turtles and lizards (Młynarski, 1953, 1955, 1956) have provided evidence for the Pliocene age of our breccia. Teeth of a young rhinoceros *Dicerorhinus megarhinus* (Christol), described by Czyżewska (1958), end up the present list of publications on the Węże fauna and provide additional suggestions to confirm the early Pleistocene age of the upper breccia layers.

The insectivores, here reported upon, cover three families, with 10 genera and 18 species. Though age determination of the breccia on insectivore evidence only, is inadequate, yet it permits the confirmation of earlier inferences and the assignment of Pliocene age to the greatest part of the Węże breccia. At the same time it seems reasonable to conclude that its lower layers reached into the Upper Miocene.

On the one hand this is indicated by species which exhibit many features in common with Miocene species and belong to that group of xerophilous forms existing in arid steppe environment: *Erinaceus samsonowiczi* n. sp., partly *Desmana nehringi* Kormos, remains of *Galemys*(?) sp., *Blarinoides mariae* n. gen., n. sp., extensively *Neomys soriculoides* n. sp., partly *Beremendia fissidens* (Petényi), remains of *Crocidura* sp., and both species *Suncus pannonicus* (Kormos) and *Suncus zelceus* n. sp. On the other hand, the remaining species, characteristic of moist palaearctic belts, with an admixture of some of the above mentioned species, distinctly date the breccia as Upper Pliocene or early Pleistocene.

As regards the new genus *Blarinoides*, it is most likely a Miocene relict. It probably became extinct owing to the cooling of climate towards the close of the Middle Pliocene, and did not leave descendants. A similar situation must have occurred for *Suncus zelceus* n. sp.

Out of the 18 species here reported upon only three have survived thus far, the others are extinct. Of the genera only three are extinct, the other seven are still living. The latest species of the extinct genera most likely survived as late as the first Interglaciation period.

PALAEOGEOGRAPHIC DISTRIBUTION OF SOME OF THE WĘŻE INSECTIVORES

Genus *Erinaceus* L. is to-day encountered within Eurasia only, and the Węże form *E. samsonowiczi* n. sp. has an Asiatic affinity. A similar situation is noted in the case of fossil species belonging to genus *Talpa* L. The subfamily Desmaninae Thomas is now encountered within a restricted area: *Galemys* Kaup in the French Pyrenees and the Iberian Peninsula; *Desmana* Güld. in the south-eastern parts of European Russia. During the Pliocene they must have ranged over considerably wider areas, including central Europe.

Genus *Neomys* Kaup, though recorded already from the Pliocene, does not seem to have been very abundant during that period, as is suggested by the few finds and publications. But copious populations of *N. soriculoides* n. sp. from Węże distinctly contradict them. It is not out of the question that this species, related with the south Asiatic genus *Soriculus* Blyth, may have its representatives also in other European sites.

Genus *Beremendia* Kormos occurred in great abundance during the Plio-Pleistocene over vast expanses of southern Europe, reaching as far north as about 51st or 52nd degree of latitude. Its western range was roughly limited by the river Rhine and the western Alps.

The subfamily Crocidurinae Milne-Edwards comprises a diverse group, at present chiefly inhabiting African regions. Remains of *Crocidura* Wagler are not numerous in the Węże breccia, similarly as in Plio-Pleistocene beds of southern Europe. Among others they confirm the supposition with regard to the occurrence — during the formation of the breccia — of repeated periods with hot climate favouring the weathering processes of limestone and the formation of red clay (terra rossa). Species of genus *Suncus* Ehrenb. likewise support this supposition.

The geographic distribution of both species: *Suncus pannonicus* (Kormos) and *S. zelceus* n. sp. in the Pliocene was wide enough to include all southern and central Europe.

The extinct genus *Petenya* Kormos, occurring in equal abundance as *Neomys soriculoides* n. sp. and *Beremendia fissidens* (Petényi) must have lived in the Pliocene over considerable areas of south-eastern Europe, but not passing beyond the upper Rhine and western Alps.

The new genus *Blarinoides* here reported is probably Lower Pliocene; the Węże find being its first recorded locality. Genus *Blarina* Gray, related

to it, now lives in Central and North America only, without, as a rule, passing to the north of the Great Lakes line.

The most interesting of all the insectivore Weże forms are *Blarinoides mariae* n. sp. and *Beremendia fissidens* (Petényi). In the Plio-Pleistocene of North America these species have their equivalents in *Blarina brevicauda* (Say) and *Paracryptotis rex* Hibbard. The striking morphological resemblance between these species suggests two alternatives. One is that of convergence, the other of faunal exchange due to the repeated connections of Asia with North America, nearly throughout the Tertiary. G. E. A. Dobson (1882-1890) was the first to advance these suggestions. He did not attach great significance to the last early Pleistocene connection of these continents and to the faunal migration of that period; but rather postulated the possibility of an earlier faunal exchange during the Tertiary. J. S. Ognev's conception (1930-34) ran along a similar line. However, he rather strongly favoured the supposition that convergence was chiefly responsible for the morphological similarities in many species of both continents.

Resemblances of cranial and mandibular structure in *Blarinoides mariae* n. sp. and *Blarina brevicauda* (Say) together with differences of the time of occurrence — the former being recorded from the Upper Miocene to Middle Pliocene, the latter from the Upper Pliocene up to recent times — are distinctly suggestive of their common origin. Eurasia must have been their birth-place while the migration of this primitive stock towards North America and Europe may have occurred as early as the Miocene. This supposition will, however, remain merely hypothetical until palaeontological evidence may be forthcoming from Asia, whence these forms have not as yet been reported. Both these genera may possibly be genetically related with genus *Heterosorex* Gaillard from the Miocene of France (Piveteau, 1958).

Early Pleistocene migration of these forms was not possible during the last connection of the continents owing to considerable cooling of climate.

A similar phenomenon is observable in the case of the European Plio-Pleistocene *Beremendia fissidens* (Petényi) and *Paracryptotis rex* Hibbard, on account of very close similarities in structure of the skull and mandible and on contemporaneity of occurrence as well. The former is known from the Lower Pliocene, probably up to the Günz-Mindel Interglacial, the latter — from the Upper Pliocene to Middle Pleistocene. The dating of the only intermediate link connecting these two species, i. e. *B. sinensis* (Zdansky) from Choukoutien, is not sufficiently reliable to determine an analogous migration route for these species as that followed by genera *Blarina* Gray and *Blarinoides* n. gen.

Upon comparing the ecology and geography of living and fossil insectivores with those described from the Węże fauna, two distinct groups may be distinguished which correspond fairly well with the twofold character of the Węże breccia. The first group comprises species existing in arid steppe environment and under continental climatic conditions; the other group those thriving in warm, moist palaeartic zones with diversified land relief, probably resembling conditions now prevailing in Eurasia.

This division of the insectivores fits quite well into the concepts of Stach (1952, p. 155-156; 1953, p. 133-134) and Młynarski (1955, p. 202-203) concerning similar duality in the palaeoecological and palaeogeographical character of the reptile and carnivore fauna.

ON THE ORIGIN OF THE WĘŻE BRECCIA

The bone material in the Węże breccia has accumulated in a haphazard fashion, without traces of sorting. Bones belonging to one or more individuals are very rarely discovered in the place where they were buried. As a rule they are fragmentary, fortuitously dispersed in the form of highly characteristic bone detritus (pl. I, fig. 1). The most common colouration of bones is dark or black. Complete, undamaged skulls of Soricidae are an exception. The rostral fragments are those most abundant.

The red layer of the breccia, with the exception of beds strongly impregnated by calcite carbonate, may be ascribed to the residual cave slime. The light coloured ("grey"), strongly calcified breccia, was formed during a period when bone remains were deposited on the cave floor by flood waters. This may appear a simplified solution of the problem, but just this character of the breccia is actually suggested by the state of preservation of bones.

The cracks and potholes due to the erosion of Jurassic limestone were sometimes overflowed by water. Besides rock debris the water carried also remains of animals that had died in the close neighbourhood, or that may have fallen into the cracks by accident, still others inhabited the cracks and fissures. Some bones of rodents and insectivores — *Erinaceus* excepted, since it is known to have no foes — may have been brought into the cave by carnivores inhabiting it. The hedgehog's presence in the cave is either accidental, or more probably due to its permanent inhabitation there. The main part of insectivore remains, however, must have been transported by action of water. Possibly too, birds of prey may have, in

part, accumulated the small mammalian remains. This is suggested by the absence of brain cases in soricides and many rodents¹.

Taking account of these data the Weże fauna may be arranged into the following groups: a) permanent or seasonal fauna of the cave, b) forms brought into the cave by predators, c) forms accidentally fallen into the cave, and d) animal remains, complete or fragmentary, carried into the cave by water during tempestuous rainfalls.

The presence in the cave of teeth remains belonging to a young rhinoceros *Dicerorhinus megarhinus* (Christol) is accidental. They may represent the remnants of a feast held by its carnivore-inhabitants.

METHODS OF WORK

The character of the breccia and of its calcareous cement made difficult the mechanical preparation of the material. The only here applicable technique is that of chemical preparation. 10-15 per cent acetic acid solution was used by the writer. Often, however, when preparing minute and delicate elements, it was only an 8 or even 5 per cent solution. For protection against injury by the acid during maceration the bones were coated with paraffine, after each drying of the block. Bones thus separated, washed and dried, were soaked in saturated solution of shellac in alcohol.

Specimens belonging to Soricidae and Talpidae were measured with a micrometer scale under a binocular microscope, and the obtained numerical data rounded to 0.1 mm. Larger elements were measured, using fine calipers, with accuracy up to 0.1 mm. Small specimens were measured under approximately tenfold magnification; in the case of larger specimens the magnification was fivefold.

In addition to the standard length measure the total and the cardinal jaw length measurement was constantly used. The total jaw measurement was taken from the end of the incisor to the furthestmost posterior point of the upper articular surface of the condyloid process, and the cardinal length on the lingual side of the jaw only, from the anterior border of the mandibular bone to the same point, as in the total measurement (fig. 2A). In order better to indicate the relation of condyloid process to the coronoid process, measurement tables are done giving the height of the condyloid process from its base at the contact with the angular process to the uppermost point of the articular surface in the condyloid process (fig. 2B).

¹ According to a personal communication of Professor Ryziewicz, the breccia has recently also yielded remains of birds probably belonging to the Falcones or Galliformes.

The measurement of the total jaw length is here less important owing to the variable incisor length changing with individual age. Cranial measurements were made according to common standards. In view of strong length, width and height variations in the skull of fossil soricids,

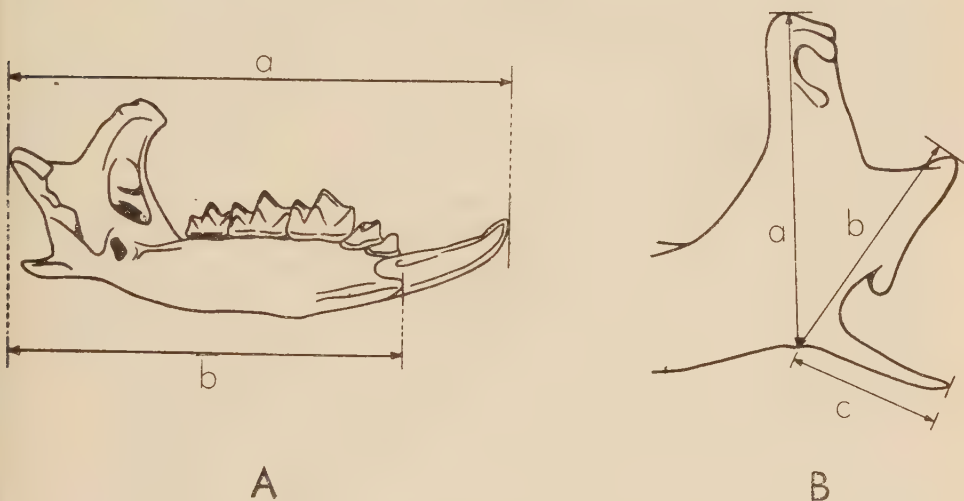


Fig. 2. — Schematic illustration of measurements

A length of mandible, *a* total, *b* cardinal; B height of articular processes, *a* coronoid process, *b* condyloid process, *c* length of angular process.

the numerical measurement data are only roughly approximate. The length measurements of the maxillary tooth-row, the length and width measurements of the palate, as well as proportions of teeth were done at the ventral side of the skulls.

The illustrations were prepared with the help of the same optical instruments as those used for measurements, and with camera lucida for the skulls and jaws of *Erinaceus* and *Desmana*. A constant 10 mm measurement scale accompanies the attached plates and photographs.

DENTITION, TOOTH-COLOURATION, AGE CLASSES AND MORPHOLOGY OF JAW ELEMENTS IN SORICIDAE

Some subjectivity in studies on fossil soricids, particularly when carrying out measurements or in the determination of diagnostic characters, seriously hinders reliable inferences. Differences in measurement data due to different measurement technique may be erroneously interpreted as an expression of geographic variation (H. Schaeffer, 1935).

In view of the mentioned difficulties which, as a rule, tend to individual interpretation by the writers, the need seems obvious for the

introduction of detailed descriptions of measurement methods, of complete and universal numerical data on new species and, if possible, of their variation graphs.

The identification of the penultimate unicuspid tooth as P^2 in *Sorex* L. and *Blarinoides* n. gen., and as P^1 in genera *Beremendia* Kormos, *Petenya* Kormos and *Neomys* Kaup, is suggested by the supposition that the numerical reduction of unicuspid teeth must have progressed from P^3 to P^1 . This reduction is also associated with the rostral shortening of the skull, and with the simultaneous overgrowth of the 2nd and 3rd upper incisors in genera of the Crocidurinae group.

As compared to the individual age classification of Soricidae given by H. T. Jackson (1928), that accepted by the present writer has been simplified. It resembles the classification recognized by A. Dehnel (1949) who distinguishes two cardinal classes: the young (adult) and the old.

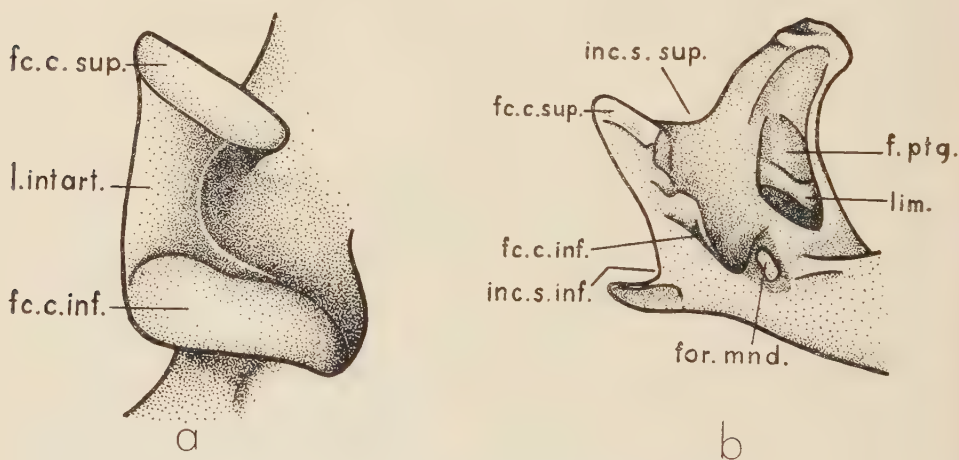


Fig. 3. — *a* Morphology of condyloid process (articular)
fc. c. sup. facies condyli superior, *fc c. inf.* facies condyli inferior, *l. intart.* lamina interarticularis.

b Morphology of articular processes and posterior part of mandible
inc. s. sup. incisura sigmoidea superior, *inc. s. inf.* incisura sigmoidea inferior, *f. ptg.* fossa pterygoidea, *for. mnd.* foramen mandibulae, *lim.* limbula.

This simplification results from the character of some remains preserved in the breccia where these two classes are easily recognizable on the extent of the wear of teeth.

One of the problems now under consideration is the diagnostic significance assignable to teeth colouration in Soricidae. Data obtained by research work of several authors (Dehnel, 1949, 1950, 1952; Kubik, 1951; Schaeffer, 1935, and others) show that the occurrence and the intensity of colouration vary in the limits of one species. On the other hand, in

some fossil forms of subfamily Crocidurinae, the colouration occurs (Hibbard, 1950) but has apparently no important taxonomic significance. This remains an open question calling for more precise observations. Dental colouration in species *Suncus pannonicus* (Kormos) and *S. zelceus* n. sp. may be cited in support of Hibbard's (l. c.) suggestion for the eventual unification of the two subfamilies of Soricinae and Crocidurinae into one taxonomic group.

Another open question is the influence of the habitat on changes in teeth colouration. Studies by M. G. Allen (1938) are interesting but require additional confirmation and more detailed investigation.

The following new terminology has been introduced by the writer in systematic descriptions on specific level:

- a) *incisura sigmoidea superior* and *incisura sigmoidea inferior* — for the upper and lower interprocessal sigmoid notches of the jaw (fig. 3a);
- b) *lamina interarticularis* — for the interarticular list of the condyloid process, usually called "bone bridge" (fig. 3b) — a name that does not adequately interpret the structure of this jaw element.

SYSTEMATIC DESCRIPTIONS

Order **Insectivora** Bowdich, 1821

Family **Erinaceidae** Bonaparte, 1838

Subfamily **Erinaceinae** Gill, 1872

Genus *Erinaceus* Linnaeus, 1758

Erinaceus samsonowiczi n. sp.

(pl. II, fig. 1 a-c & 2)

Holotypus: specimen No. 1051¹, left lower jaw bearing P₃-M₃ and fragmentary articular processes.

Paratypus: specimen No. 1052, left mandible with P₃-M₃ and condyloid process.

Derivatio nominis: *samsonowiczi* — in honour of Professor Jan Samsonowicz, discoverer of Weże breccia.

Material. — 8 lower jaws represented by fragments of ascending ramus and horizontal ramus with incomplete dentition; fairly numerous detached, lower and upper teeth and two rostral fragments of skulls: one with right portion of maxilla, and incomplete dentition probably belonging to this species.

Description. — Horizontal ramus set at an approximately right angle to ascending ramus, tapering anteriorly from P₄. Position of mental foramen between P₄ and M₁ lower than in the living hedgehog. Height

¹ All the here figured and described specimens are housed in the Muzeum Ziemi (Museum of the Earth) in Warsaw, and numbered provisionally by the present author.

of jaw branch in P_4 to M_2 more or less uniform, but lower beyond M_3 . Condylod process strong, articular facet broad and nearly vertical to ascending ramus. Shape of articular facet nearly regularly elliptical, lingually slightly expanded. Upper portion of coronoid process curved to the rear, blunt. Angular process broad and massive at the base. An oblique crest placed labially to ascending ramus extends to the condylod process. Mandibular fossa small, oval. First lower incisor basally broad, elongated, with a conspicuous, slender and pointed cutting edge. Cingulum of incisor strong, but anteriorly almost vestigial. Alveoles of 2nd incisor notably smaller than the preceding one. Alveole of canine large, nearly round, slightly labially pushed. P_3 one-cusped, with cone very blunt, cingulum conspicuous, raised in posterior part to form a kind of cusp. P_4 three-cusped, paraconid high, pointed, rising almost vertically; protoconid higher, fairly pointed, directed posteriorly; metaconid more or less conspicuous. Anterior edge of paraconid slightly pointed. Labially cingulum less well developed. First molar with trigonid narrower than the talonid, bearing three well developed cusps — all notably blunt, the protoconid excepted — and a talonid also bearing two rather blunt cusps. Structure of crown in the next molar resembles that of M_1 , all its cusps being markedly blunt. In M_1 and M_2 cingula labially better marked. M_3 is the smallest molar, consisting only of the strongly reduced trigonid with not more than one or two cusps and one root. In this molar the paraconid is either very much reduced or absent. Mandibular symphysis oblique, broad. Tooth pigmentation dark brown or nearly black. Skull (rostral fragment with right-side dentition), comprising also right portion of palate, nasal bones, some premaxillary bones, frontal bones and part of the zygomatic arch. Premaxilla not joint with frontal bones. Lacrimal foramen similarly placed as in the living hedgehog. Nasal bones narrow, slender, frontal bones relatively broad, nasal foramen wide, with probably elongated contour. Maxillar foramen pushed somewhat anteriorly above the anterior canine root.

Dimensions — see Table 1.

Remarks. — The Weże specimens are rather smaller than any species of *Erinaceus* L. thus far described from the pre-Glacial of Europe, with the exception of *Erinaceus lechei* Kormos. On their morphology and dimensions it has been ascertained that the here considered remains resemble the Chinese Plio-Pleistocene form from Choukoutien *E. olgae* Young and the living *E. europaeus amuriensis* Schrenk (C. C. Young, 1934). Specimens of *Erinaceus* sp. described by C. W. Pei (1940) and Teilhard de Chardin (1940) belong to another group of hedgehogs (*dealbatus*) and markedly differ from the Weże specimens. Our specimens are smaller than the Miocene *Palaeoerinaceus* cf. *rectus* Matthew & Granger (B. Boh-

Table 1
Erinaceus samsonowiczi n. sp. — dimensions of mandibles (in mm)

Mandibles →	1	2	3	4	5	6	7
Specimen Nos. →	1051	1052	1057	1054	1053	1056	1055
Total length of mandible	—	—	—	ca.38.4	—	—	—
Cardinal length of mandible	33.8	36.1	—	ca.35.5	—	—	—
Length of:							
I ₁ -M ₃	—	—	—	24.1 a*	—	—	—
C-P ₄	18.0 a	—	—	18.8 a	—	17.7 a	—
I ₂ -M ₃	18.8 a	—	—	20.0 a	—	19.8 a	—
P ₃ -M ₃	16.0 a	17.3	16.3	16.4	—	16.1 a	—
P ₄ -M ₃	14.1 a	14.7	14.0	14.2	14.3	14.4 a	14.6
M ₁ -M ₃	11.8 a	12.1	11.5	11.5	11.8	11.8 a	12.2
M ₁ -M ₂	10.5	9.8	10.0	9.8	10.1	10.1	10.2
M ₂ -M ₃	6.5 a	6.6	6.6	6.7	6.7	6.6 a	6.7
I ₂ -P ₄	7.4 a	—	—	8.6 a	—	7.5 a	—
Length of P ₃	2.2	2.2	2.4	2.2	—	—	—
Breadth of P ₃	2.0	2.0	2.0	2.0	—	—	—
Length of P ₄	2.9	2.8	2.9	3.0	2.8	2.8	3.1
Breadth of P ₄	2.2	2.4	2.1	2.3	2.2	2.3	2.3
Length of M ₁	5.4	5.5	5.0	5.4 a	5.1	5.4 a	5.5
Breadth of M ₁ at trigonid	3.3	3.1	3.2	—	3.2	—	3.2
Breadth of M ₁ at talonid	3.5	3.5	3.5	—	3.4	—	3.3
Length of M ₂	4.9	5.0	4.7	4.9	5.2	5.0	5.0
Breadth of M ₂ at trigonid	3.3	3.0	3.2	3.0	3.3	3.0	3.1
Breadth of M ₂ at talonid	3.3	3.2	3.3	3.0	3.3	3.0	3.3
Length of M ₃	2.3 a	2.0	1.9	2.0	2.2	1.8 a	2.0
Breadth of M ₃	1.7 a	1.8	1.6	1.8	1.8	1.5 a	1.5
Height of mandible behind:							
M ₁	7.2	7.2	6.9	7.1	6.9	7.2	7.0
M ₂	6.6	7.1	6.5	6.8	6.7	6.9	—
M ₃	6.2	6.7	6.0	6.3	6.2	6.2	6.3
Thickness of mandible below:							
M ₁	3.2	3.2	3.2	3.0	3.0	3.2	3.2
M ₃	3.1	3.4	3.1	3.2	3.3	3.4	3.3
Breadth of condyloid process	5.6	5.0	—	—	—	—	—
Height of ascending ramus	17.6 ?*	—	—	—	—	—	—
Length of angular process	9.6	—	—	—	—	—	—
Distance between condyloid and angular processes	11.4	—	—	—	—	—	—

* — measured along the alveoles, ? — measurement uncertain.

lin, 1942; J. Viret, 1938) and their dental proportions exhibit marked dissimilarities. Neither is a closer correlation possible between the Weże species and *E. praeglacialis* Brunner, 1934, owing to inadequate knowledge of the latter.

Some mandibular fragments of this newly recorded hedgehog from Weże resemble *E. sansaniensis* Depéret, 1887 described from the Miocene of France. The position of the mental foramen is similar, the lower mandibular edge is arcuately bent down in both forms, ascending ramus likewise placed at a right angle to horizontal ramus. Similar conditions are noted in conspecific specimens described by C. Gaillard (1899) from Grive-Saint-Alban. The Weże specimens, however, differ not in size only, but also in arrangement of teeth, larger dimensions of I_2 , position of cusps on P_4 , lower depression of mental foramen and more robust articular processes of ascending ramus.

The separation of the Weże specimens into a new species of hedgehogs is suggested on the following features: characteristic low position of mental foramen, smaller length of the tooth-row I_1-M_3 , strong structure of the whole lower jaw, smaller dimensions of cardinal length, differences of length in tooth-rows P_3-M_3 and P_4-M_3 , shape of P_3 and P_4 which, as a rule, are with a slightly posteriorly curved protoconid, finally frequent strong reduction of trigonid in M_3 .

Erinaceus sp.

(pl. IV, fig. 11)

Material. — Two left mandibular fragments lacking dentition and with strongly injured articular processes. One fragment with the I_1-M_3 alveoles, the other with M_2-M_3 alveoles.

Dimensions of two mandibles (in mm):

Mandibles →	1	2
Specimen Nos. →	1060	1061
Length of tooth-row:		
C- M_3	16.4	—
M_1-M_3	11.8	—
M_2-M_3	6.6	6.2
Height of mandible below:		
M_1	5.5	—
M_2	5.7	5.2
M_3	5.3	5.0
Thickness of mandible below:		
M_1	2.9	—
M_2	3.0	2.9
M_3	3.3	3.0

Remarks. — In dimensions both fragments approach *Erinaceus lechei* Kormos, 1934, described from Hungary. But the unsatisfactory state of preservation and meagre materials do not allow its specific identification.

Family **Talpidae** Gray, 1825

Subfamily **Talpinae** Murray, 1866

Genus *Talpa* Linnaeus, 1758

Talpa minor Freudentberg, 1914

(pl. IV, fig. 10)

1914. *Talpa europaea* var. *minor* Freudentberg; W. Freudentberg, Die Säugetiere..., p. 209, pl. 19, fig. 7, 32, 35-37.

Further synonymy in:

1956. *Talpa minor* Freudentberg; K. Kowalski, Insectivores..., p. 341-342, pl. 1, fig. 1, and

1955. *Talpa minor* Freudentberg; M. Kretzoi, Die Altpleistozäne..., p. 162, 192, 197-200, 232.

1958. *Talpa minor* Freudentberg; K. Kowalski, An early Pleistocene..., p. 8, 9.

Material. — About 15 mandibular fragments, in various state of preservation and with incomplete dentition. Several specimens with M_1 - M_3 or C- P_4 , a few detached molars, canines and incisors, also long bones of limbs. A dozen or so of humeral bones. Skulls unknown.

Dimensions of 5 mandibles (in mm):

Mandibles →	1	2	3	4	5
Specimen Nos. →	518	565	567	569	300
Length of:					
I_1 - M_3	10.8 a*	11.2 a	—	—	—
M_1 - M_3	5.4	5.2	5.3	5.6	5.0
M_1	2.0	1.9	1.9	2.0	1.9
Breadth of M_1	1.2	1.1	1.2	1.3	1.2
Length of M_3	1.5	1.4	1.5	1.6	1.4
Breadth of M_3	0.8	0.7	0.7	0.8	0.6
Height of mandible below M_2	1.7	1.7	1.7	1.7	1.6
Thickness of mandible below M_2	1.0	1.1	1.0	1.1	1.0
Height of coronoid process	5.2 ?*	5.1 ?	—	—	—

a — measured along the alveoles, ? — measurement uncertain.

Humerus (in mm)

Length 10.6 to 11.5
Smallest breadth 3.1 to 3.5

Remarks. — The appearance of horizontal ramus on the whole agrees with those described by W. Freudenberg (1914) and K. Kowalski (1956, 1958). Ascending ramus set at right or slightly obtuse angle to horizontal ramus. Posterior mental foramen approximately between the roots of M_1 , but more often below the posterior root of that tooth. Teeth and humeral bones structurally approaching *T. europaea* L., but smaller and more delicate.

Talpa fossilis Petényi, 1864

(pl. IV, fig. 9 a-b)

1864. *Talpa vulgaris fossilis* Petényi; J. S. Petényi, Hátragyott Munkai..., p. 53-58, pl. 1.

Further synonymy in:

1958. *Talpa fossilis* Petényi; K. Kowalski, An early Pleistocene..., p. 9-10, fig. 1.

Material. — About 10 incomplete lower jaws, also fragmentary maxillae in various state of preservation; numerous detached molars, several canines and incisors; fragmentary humeral bones.

Dimensions of 3 mandibles (in mm):

Mandibles →	1	2	3
Specimen Nos. →	951	952	953
Length of:			
C- M_3	12.6 a*	—	—
M_1 - M_3	6.8	6.3	6.8
M_1	2.5	2.3	2.4
Breadth of M_1	1.5	1.4	1.5
Length of M_3	2.0	1.9	2.1
Breadth of M_3	1.0	0.9	1.0
Height of mandible below M_2	2.2	2.1	2.0
Thickness of mandible below M_2	1.3	1.2	1.1

* a — measured along the alveoles.

Humerus (in mm):

Maximum length	13.6 to 14.0
Minimum „	3.9 to 4.1
Proximal breadth	11.4 to 12.2
Distal „	8.8 to 9.2

Remarks. — Morphologically this mole closely resembles living *Talpa europaea* L. It is only on stronger structure of teeth and of the mandibular horizontal ramus, and some differences in individual molars that these fossil remains can be distinguished from recent moles. In the Węże

specimens the protoconids and hypoconids are somewhat extended anteriorly. Cingulum of molars is more conspicuous and better developed anteriorly. In recent moles the molar talonids are narrower and the row with molars distinctly shorter. Posterior mental foramen is, as a rule, below the anterior root of M_1 . Along M_1 - M_3 horizontal ramus of nearly uniform height. The same applies here to thickness of mandible. The canine distinctly higher than the premolars, one-topped, narrow, with spicule directed somewhat posteriorly. Premolars (P_1 - P_4) are with distinct cingulum, posteriorly stretched out so as to form small cusps. The coronoid process relatively low, similarly as in *T. praeglacialis* Kormos (Kormos, 1937 a, b; Heller, 1936 a, 1954). Structure and dimensions of humeral bones usually typical of this genus.

The Weže specimens are notably larger than *T. minor* Freudenberg, but only slightly so than *T. episcopalis* Kormos (Kretzoi, 1956). In size they nearly agree with *T. strömeri* Brunner, 1950. In a strong anterior curvature of the tooth tips the latter form differs distinctly from *T. fossilis* Petényi. The structure and size of humeral bones are similar in these two species.

Talpa europaea fossilis L. described by A. Pasa (1950) is only slightly smaller than the here studied species and is probably conspecific. *Talpa* sp. recorded by C. W. Pei (1931) from the early Pleistocene of Choukoutien exhibits many features in common with *T. fossilis* Petényi. Its humerus, however, is smaller, while the vast geographical distance of their occurrence does not suggest a closer relationship.

Talpa sp.

Material. — Some incomplete lower jaws and articular processes, one incomplete humerus, a few detached molars.

Remarks. — The here represented specimens do not permit more exact specific classification. Nevertheless in size of horizontal ramus they approach nearer to the living *Talpa europaea* L. This is moreover suggested by the shape and size of the humeral bone, morphology of molars and character of the preserved fragments of articular processes. These mole remains have been recovered from calcareous rock debris in the upper portion of the karst doline, probably referable to the final period of formation of the Weže breccia.

Subfamily **Desmaninae** Thomas, 1912Genus *Desmana* Gldenstaedt, 1777*Desmana nehringi* Kormos, 1913

(pl. II, fig. 3 a-d)

1913. *Desmana* (?) *Nehringi* Kormos; T. Kormos, Trois nouvelles espces..., p. 138, pl. 6, fig. 1 a-f.
Further synonymy in:
1956. *Desmana nehringi* Kormos; K. Kowalski, Insectivores..., p. 342-344, pl. 1, fig. 2 a-b, 3 a-b.

Material. — Several lower jaws, fairly well preserved; one represents the right mandible with I_2 , P_2 - M_2 and damaged articular processes; also a nearly complete skull lacking the zygomatic arches, with the skull roof partly damaged, with dentition more or less complete on both sides of the jaws.

Description. — *Mandible.* The mandibular structure does not essentially differ from the type described by Kormos (1913). The differences consist in certain morphological features which may be assigned to individual variation. The more important differentiating features of the Wze specimens are: position of anterior mental foramen (between roots of P_1 and P_2 or below P_2), also that of posterior mental foramen (below the protoconid of M_1 or below the anterior root of that tooth), structure of P_2 with well developed cingulum lacking the paraconid, structure of P_3 with the labial cingulum more distinct and a kind of posterior cusp, structure of P_4 with distinct paraconid and a conspicuous labial cingulum strongly curved over the branching roots. In the Wze specimens the molars are with higher protoconids, while the talonids are broader than the trigonids which have a strong labial cingulum. Last molar is the lowest with unreduced talonid. The two jaw branches of the Wze specimens meet at right angle, as in Hungarian specimens. The condition is similar in P_3 alveoles where the posterior root of that tooth has been pushed somewhat lingually. The articular processes here are probably shaped as in typical forms from Hungary.

Skull satisfactorily preserved, strongly elongated, with occipital part broad and domed. Foramen magnum oval, horizontally expanded. The remnants of the zygomatic arch suggest that the arches were delicate and slender. In the upper orbital part the skull strongly constricted, nasal bones long and narrow, sharply terminating within the suture with frontal bones. Upper incisors I^{1-1} large, broad at the base, in section subtriangular. Their anterior and posterior edges sharp. These teeth are more or less depressed posteriorly, their talonids low. The outer tooth surface covered by delicate enamel mosaic. Nasal foramen horizontally

Table 2

Desmana nehringi Kormos — dimensions of skulls (in mm)

Skulls →	1	2	3
Specimen Nos. →	1201	1202	1203
Total length of skull	45.7	—	—
Maximal breadth of skull	20.1	—	—
Minimal breadth of skull	8.5	8.0	—
Anterior breadth of palate	5.5	5.2	—
Posterior " " "	13.2	13.5	—
Nasal height of skull in P ¹	5.0	4.8	—
Rostral height of skull in M ²	8.0	7.6	—
Maximal breadth of alveole I ¹	2.9	2.5	2.8
Minimal " " " "	1.1	1.0	1.2
1. Length of C	1.2	1.1 a*	1.0
2. Breadth of C	1.3	1.3 a	1.1
1:2	0.92	ca. 0.84	0.99
1. Length of P ¹	2.0	1.8 a	1.9
2. Breadth of P ¹	1.3	1.3 a	1.2
1:2	1.53	ca. 1.38	1.58
1. Length of P ²	2.1	2.1 a	2.2
2. Breadth of P ²	1.5	1.6 a	1.6
1:2	1.40	ca. 1.31	1.38
1. Length of P ³	1.3	1.3	1.4
2. Breadth of P ³	1.6	1.5	1.6
1:2	0.81	0.90	0.87
1. Length of P ⁴	2.5	2.2	2.5
2. Breadth of P ⁴	2.3	2.3	2.5
1:2	1.08	0.95	1.00
Length of M ¹	2.8	2.7	—
Breadth of M ¹	3.3	3.3	—
Length of M ³	1.8	2.0	—
Breadth of M ³	2.0	2.1	—
Length of:			
I ¹ -M ³	22.0	22.5 a	—
C-P ⁴	9.1	8.6 a	9.0
M ¹ -M ³	7.2	7.0	—
Breadth of bridge over infraorbital foramen	0.8	0.9	—
Breadth of nasal part for I ¹ -1	6.2	6.4	—

* a — measured along the alveoles.

T a b l e 3
Desmana nehringi Kormos — dimensions of mandibles (in mm)

Mandibles —————→	1	2	3
Specimen Nos. —————→	1204	1205	1206
Total length of mandible	ca. 26.3	—	—
Length from the anterior border of mandible bones to the posterior border of M ₃	ca. 16.3	—	—
Length of:			
I ₁ -M ₃	20.0 a*	—	—
C-M ₃	14.3 a	—	—
M ₁ -M ₃	7.5 a	7.5	7.3
Length of M ₁	2.8	2.6	2.8
Breadth of M ₁ at talonid	2.5	2.2	2.0
Breadth of M ₁ at trigonid	1.8	1.8	1.8
Length of M ₃	—	2.2	2.0
Breadth of M ₃ at talonid	—	1.6	1.5
Breadth of M ₃ at trigonid	—	1.6	1.6
Height at protoconid of:			
P ₄	1.8	1.8	—
M ₁	2.1	2.1	1.6 ?*
M ₂	2.5	2.5	1.8 ?
M ₃	—	1.6	1.2 ?
Height of mandible below M ₂	3.5	3.6	3.3
Thickness of mandible below M ₂	2.1	2.2	2.0
Breadth of condyloid process	—	2.6	—
Height of ascending ramus	—	ca. 11.3	—
Distance between the anterior and posterior mental foramens	6.5	6.2	—

* a — measured along the alveoles, ? — measurement uncertain.

expanded. Anterior edge of nasal bones — over nasal foramen — slightly convex anteriorly. Bridge over infraorbital foramen narrow, faintly oblique; its lower end is between M₁ and M₂. Second and third incisors somewhat smaller than the talon of I¹, one-topped, one-rooted, with distinct labial cingulum. C higher than incisors, two-rooted, one-topped, and a more or less conspicuous postero-lingual cusp. P¹ lower than the canine, with one root and the cingulum labially more distinct. The next premolars of similar structure, with two roots, with labially distinct cingulum and posterior small heels. Last premolar high, with a strong protocone. In structure this tooth does not essentially differ from P⁴, as has been observed in a type form from Hungary and in specimens from Podlesice. First molar with subtriangular outline at top and with elongated talon. Metacone and metastyle of M¹ joint by a sharp edge. Posterior

mesostyle also joint to the metacone along a short edge which curves out anteriorly. Parastyle with a conspicuous knob. Anterior molar cingulum strong. Next molars of similar structure. Last molar strongly reduced, shorter and narrower.

Dimensions of 3 skulls and 3 mandibles — see Tables 2 & 3.

Remarks. — Differences in proportions between C and P^3 of the Weže specimens and those described by A. Schreuder (1940) may, possibly, result from different measurement methods. These differences suggest that the skull belonged to another species. Nevertheless the study of other teeth permits to ascertain that these characters are subject to variation and may not be regarded as diagnostic features. Indices noted in these forms have not been reported in any other species of *Galemys* Kaup and *Desmana* Güld. The characteristic arrangement of teeth and their structure, breadth of bridge over infraorbital foramen and the mandibular morphology — all indicate genus *Desmana* and species *D. nehringi* Kormos. On the other hand, a relatively wide bridge over infraorbital foramen, sharp anterior edge of protocone in P^4 , and the weakly developed cingula of lower molars exclude genus *Galemys* Kaup.

Genus *Galemys* Kaup, 1829

Galemys (?) sp.

Material. — Fragments of skulls (rostral parts) with many gaps in dentition, also fragments of lower jaws either with or without teeth. Few detached teeth of the upper and lower jaw.

Dimensions of 3 skulls and 2 mandibles — see Table 4.

Remarks. — The fragmentary condition of the recovered remains does not permit their sure specific identification, neither is their generic identification quite doubtless. On measurements it may be ascertained that these forms are notably smaller than *Desmana* Güld., in size coming nearer *Galemys* Kaup, possibly one of the Hungarian forms: *G. semseyi* Kormos or *Mygalina hungarica* (Kormos) (Schreuder, 1940). Differences in shape of maxillary teeth, and the smaller breadth of bridge over infraorbital foramen, do not permit their definite assignment to one of these species.

The presence in Weže of genus *Galemys* Kaup may indicate a farther northern range of the Pliocene occurrence of this genus. It has been actually recorded from Plio-Pleistocene formations nearly all over Europe. In central and eastern Asia it is not known either as a living or extinct form.

T a b l e 4
Galemys (?) sp. — dimensions of skulls and mandibles (in mm)

Skulls →	1	2	3
Specimen Nos. →	1301	1302	1303
Anterior breadth of palate	4.4	5.0	—
Posterior breadth of palate	10.6	11.6	—
Length of tooth-row with:			
M ¹ -M ³	6.3	6.5	6.3
M ¹ -M ²	4.5	5.0	4.8
M ² -M ³	4.0	3.8	3.8
Thickness of bridge over infraorbital foramen	0.6	0.7	0.6

Mandibles →	1	2	3
Specimen Nos. →	1304	1305	1306
Length of tooth-row with:			
M ₁ -M ₃	—	6.8	7.0?*
M ₂ -M ₃	4.5?	4.5	4.7
Length of M ₁	—	2.5	—
Breadth of M ₁ at talonid	—	1.1	—
Breadth of M ₁ at trigonid	—	1.0	—
Length of M ₃	2.0	2.1	2.1
Breadth of M ₃ at talonid	1.4	1.0	1.5
Breadth of M ₃ at trigonid	1.4	0.8	1.4
Height of mandible below M ₂	3.0	3.1	3.0
Thickness of mandible below M ₂	1.6	1.6	1.7

* ? — measurement uncertain.

Family **Soricidae** Gray, 1821
 Subfamily **Soricinae** Murray, 1866
 Genus *Sorex* Linnaeus, 1758
Sorex runtonensis Hinton, 1911
 (pl. IV, fig. 5 a-b)

1911. *Sorex runtonensis* Hinton; M. A. C. Hinton, The British Fossil..., p. 532, pl. 25, fig. 8, 9; textfig. 8-a.
 1930. *Sorex runtonensis* Hinton; F. Heller, Eine Forest-Bed-Fauna..., p. 259, pl. 15, fig. 5 a-b; textfig. 6.
 1933. *Sorex runtonensis* Hinton; G. Brunner, Eine praeglaziale Fauna..., p. 309, pl. 6, fig. 1-3; textfig. 1, 2.
 1933. *Sorex runtonensis* Hinton; F. Heller, Ein Nachtrag..., p. 62.

1937. *Sorex runtonensis* Hinton; T. Kormos, Revision der Kleinsäugetiere..., p. 31-33, fig. 3.
 1949. *Sorex runtonensis* Hinton; M. Friant, Les Musaraignes..., p. 239, fig. 3.
 1958. *Sorex* cf. *runtonensis* Hinton; K. Kowalski, An early Pleistocene..., p. 11-12, fig. 2.

Material. — About 25 mandibular fragments, variously preserved; numerous detached incisors and molars, long limb bones, also fragmentary upper jaws, probably conspecific.

Description. — Morphologically the preserved mandibular remains come nearest to forms described from West-Runton (Hinton, 1911). The lower incisor has three lobes, separated by two distinct notches. The two posterior lobes are stronger than the anterior one. The premolar is two-topped, with the hypocone not so well developed as in the remaining soricides. M_3 with five cusps. The coronoid process slender, basally broad. Ascending ramus meets horizontal ramus at right or slightly obtuse angle. Articular facet of the coronoid process smooth, without narrowings. Masseter crest as in living *Sorex araneus* L. In the condyloid process the articular facets resemble those in *S. araneus* L., with the lingual end of the lower facet extending farther down. Upper and lower sigmoid notches emarginated, conspicuous. Pterygoid fossa high, deep, triangular. Mental foramen in front of the anterior root of M_1 or below P_4 . Tips of teeth discoloured or distinctly pigmented.

In one cranial fragment lacrimal foramen placed between the roots of M^1 . Five unicuspid teeth. Other features as in the living Common Shrew.

Dimensions of 5 mandibles (in mm):

Mandibles →	1	2	3	4	5
Specimen Nos. →	1	55	15	136	148b
Total length of mandible	11.2	12.0	12.4	—	—
Cardinal length of mandible	9.0	8.6	9.1	8.8	8.8
Length of I- M_3	7.3	7.1	7.1	7.0	6.9
Length of M_1 - M_3	3.8	3.6	3.7	3.3	3.8
Height of mandible below M_2	1.4	1.3	1.3	1.3	1.3
Thickness of mandible below M_2	0.9	0.8	0.8	0.8	0.8
Height of coronoid process	4.0	4.0	3.9	3.8	4.1
Individual age of specimen	y	o	u	n	g

Remarks. — Among recent European shrews *Sorex caecutiens* Laxmann occupies an intermediate position in what size is concerned between *S. araneus* L. and *S. minutus* L. Hence, *S. runtonensis* Hinton ought to be nearest to that species. The height of the coronoid process is analogous with that in *S. caecutiens* Laxmann, but the other characters fit into the variation of *S. araneus* L.

In forms from Hundsheim known as *S. pygmaeus* Pallas (Freudenberg, 1914) and definitely identified by Kormos (1937b) as *S. runtonensis*, the total length of the lower jaw is about 15 mm. The length of the Węże specimens supposed to be 12.4 mm, but probably ranges from 11 to 13 mm.

S. praeearaneus described by Kormos (1934) may possibly be a synonym of *S. runtonensis* Hinton.

Sorex araneus Linnaeus, 1758

(pl. IV, fig. 8 a, b)

Material. — A score or so of fairly well preserved mandibles, among them one nearly complete with slightly damaged articular processes; detached upper and lower teeth. Cranial fragments represented by rostral parts with unicuspid teeth typical of this species.

Dimensions of 6 mandibles (in mm):

Mandibles —————→	1	2	3	4	5	6
Specimen Nos. —————→	500	85	305	2	633	481
Total length of mandible	11.8	11.8	11.1	11.4	11.4	11.7
Cardinal length of mandible	9.3	9.3	9.2	9.2	9.4	9.5
Length of I-M ₃	8.1	8.2	8.5	8.3	8.5	—
Length of M ₁ -M ₃	4.0	4.1	4.0	4.0	3.9	4.1
Height of mandible below M ₂	1.5	1.6	1.5	1.4	1.5	1.5
Thickness of mandible below M ₂	0.8	0.9	0.8	0.9	0.9	0.8
Height of coronoid process	—	4.6	—	—	—	—
Individual age of specimen	y o u n g		old	y o u n g		

Remarks. — Craniometric dimensions and mandibular morphology almost identical as in the Common Shrew. Slight differences, consisting in somewhat greater length of the tooth-row M₁-M₃, have no significance here and fit into the rather strong individual variation displayed by this species. This also applies to the position of mental foramen, shape of articular facets in the condyloid process, and the morphology of the incisor and other mandibular teeth.

The presence in the breccia of this species confirms the supposition that the material was mixed after excavation. This is a form recorded from the earliest Pleistocene and, so far, never reported from the Pliocene.

Sorex cf. minutus Linnaeus, 1766

(pl. IV, fig. 3 a, b)

Material. — Several fragments of mandibles with incomplete dentition and partly damaged articular processes; numerous long bones of

limbs, detached upper and lower teeth, also a dozen or so of fragmentary maxillae, probably of the same species; complete skull not known.

Dimensions of 6 mandibles (in mm):

Mandibles —————→	1	2	3	4	5	6
Specimen Nos. —————→	207	325	179	335	331	327
Total length of mandible	8.3	8.8	8.9	8.7	—	—
Cardinal length of mandible	6.6	7.2	7.4	7.1	—	—
Length of I-M ₃	5.7	6.1	6.2	—	—	—
Length of M ₁ -M ₃	3.0	3.2	2.8	—	—	—
Height of mandible below M ₂	1.0	0.8	0.8	1.0	0.8	0.6
Thickness of mandible below M ₂	0.6	0.5	0.6	0.5	0.6	0.6
Height of coronoid process	3.0	2.9	3.0	3.1	3.3	—
Individual age of specimen	y o u n g					old

Remarks. — Very small mandibles, with teeth and articular processes, so characteristic of this species, are not abundant in the breccia. From *Sorex minutissima* Heim de Balsac (1940) they differ in arrangement of lower molars. The molars of the Węże specimens are with relatively low crowns and with cusps not so distinctly anteriorly extended as in *S. minutissima*. From the living shrew they differ in somewhat smaller size.

Sorex sp.

(pl. IV, fig. 6 a-c, 7 a-c)

Material. — More than ten mandibles with incomplete dentition; numerous detached lower molars, also lower incisors.

Dimensions of 5 mandibles (in mm):

Mandibles —————→	1	2	3	4	5
Specimen Nos. —————→	1100	1101	1102	1103	1104
Length of I-M ₃	7.8	8.2	7.7	6.9	7.5
Length of M ₁ -M ₃	4.2	4.0	4.1	3.8	4.2
Height of mandible below M ₂	1.6	1.7	1.6	1.6	1.6
Thickness of mandible below M ₂	1.1	1.0	1.2	1.1	1.2
Height of coronoid process	5.3	5.7	—	5.2	—
Individual age of specimen	y o u n g		old	y o u n g	

Remarks. — The incomplete state of preservation of these remains bars its comparison with thus far described species. In size they approach *Sorex savini* Hinton (Hinton 1911; Kormos, 1937b) and *S. dehnelti* Kowalski, 1956. The morphology of teeth and articular processes, also of the

horizontal ramus, agrees fairly well with analogous characters in the two above named species. The determination of their systematic position calls for additional materials. Some fragments may belong perhaps to *S. margaritodon* Kormos, 1935.

Genus *Blarinoides* n. gen.

Genoholotypus: *Blarinoides mariae* n. sp.

Derivatio nominis: *Blarinoides* — after its resemblance to the American genus *Blarina* Gray.

Diagnosis. — A large shrew with dental formula

$$\begin{array}{cccc} 3 & 1 & 3 & 3 \\ 1 & 1 & 1 & 3 \end{array} = 32.$$

Ascending ramus and horizontal ramus of mandible massive. Lower mandibular incisor long, massive, with two distinct lobes on the cutting edge and a small accessory lobe just beyond the tip of that tooth. The canine small, flattened. P_4 large, with indistinct two cusps, with a well developed posteriorly extended cingulum. M_3 three times smaller than M_1 , with five cusps (entoconid small, visible). Coronoid process broad, gently anteriorly flexed. Masseter crest with spine. Condylod process massive, interarticular list broad, slightly linguall notchod. Upper articular facet of condylod process inclined at an angle of about 45° . Ascending ramus meets horizontal ramus at an obtuse angle.

Profile of skull gently sloping, typical of genera *Sorex* L. and *Blarina* Gray. Nasal foramen high, of nearly uniform width throughout its height. Strong external flexions observable next to the roots of P^4 . Lacrimal foramen above the posterior root of M^1 . Infraorbital foramen above P^4 . Anterior palate foramens between I^2 and I^3 , posterior palate foramens just in front of anterior roots of M^{1-4} . I^2 and I^3 large (the third somewhat larger than the second) with postero-lingual cusps. C and P^1 about half the size of incisors, similar in structure. P^2 minute, pushed below P^4 , laterally not visible. Molars slightly posteriorly excavated. M^3 three-cusped with reduced talon.

Blarinoides mariae n. sp.

(pl. II, fig. 4 a-b; pl. III, fig. 6 a-c; text-fig. 4, 2 a-f)

Holotypus: specimen No. 803, rostral part of skull with M^{1-4} — M^3 — M^3 , and an incomplete row of incisors and premolars.

Paratypus: specimen No. 178, left mandible with articular processes and I — M_3 . Mandible and skull probably belonging to the same individual.

Derivatio nominis: *mariae* — from Maria, the name of the author's mother.

Material. — Five complete mandibles and 10 rostral parts of skull with incomplete dentition. Also about 40 mandibular and cranial fragments,

variously preserved; numerous detached upper and lower teeth and long bones of limbs.

Description of holotype. — *Mandible.* Incisor massive, thick, long, slightly upcurved. Cutting edge with three lobes, the anterior lobe low, often indiscernible in old individuals. Distinct, thick cingulum at the base of the incisor. Canine small, compressed and overlapped by a large, indistinctly two-topped P_4 . Premolar with cingulum strongly posteriorly extended (almost below the protocone of M_1). M_1 large, with cingulum extremely strong, protruding and expanded downwards (below the protoconid). Cusps conspicuous, pointed, talonid distinctly with three cusps. M_2 smaller than M_1 , similar in structure. M_3 nearly three times smaller than M_1 , with entoconid small but distinct. The coronoid process proximally broad, spade-like, with a well marked step. Articular facet of the process smooth, elongate. Masseter crest stout, irregularly semi-lunar; its lower end directed towards the upper articular facet of the condyloid process. Spine present, protruding. Condyloid process strong, interarticular list wide, slightly lingually notched, labially more or less rectilinear. The upper articular facet set obliquely in relation to the lower, at an angle of about 45° , or less. The lower facet with the lingual end slightly downcurving; its upper line centrally depressed. The angular process basally broad, relatively short, terminally somewhat pointed, at the base slightly thickened. Upper sigmoid notch broad, subrectangular, lower sigmoid notch as a rule not distinct. Pterygoid fossa small, quadratic, with a small transverse sill, which is barely visible. Mandible fossa oval, not overgrown. Mental foramen between roots of M_1 and the adjoining depression. Tooth pigmentation marked by lighter coloured tips. Horizontal ramus massive, high, of about uniform height below the molars. Ascending ramus at the base posteriorly flexed, the distal end rising vertically or anteriorly bent. The jaw branches meeting at an obtuse angle.

Skull. Five unicuspid in the row I^1 - P^4 . In profile rostral part of skull gently sloping, relatively narrow. Nasal foramen more or less uniformly wide throughout its height, tapering sometimes in the lower part. Slight thickenings noted on surface of nasal bones near the roots of I^1 - I^4 . A similar condition occurs near the anterior root of P^4 . The zygomatic process slightly outcurved, vestigial. Infraorbital foramen usually above P^4 , sometimes slightly pushed towards the anterior root of M^1 . Lacrimal foramen above the posterior root of M^1 , sometimes between the roots of that tooth. Anterior palate foramina between I^2 - I^4 . A small elongate and narrow fissure present behind and between these foramina. Posterior palate foramina just in front of the anterior roots of M^1 - I^1 . I^1 hooked down and towards the centre of the jaw, with a distinct talon. Next incisors

large, with distinctly thick cingulum and postero-lingual cusps. I^2 and I^3 of about equal size, the latter more often slightly larger than the former. C and P^1 smaller than incisors. P^2 the smallest and wedged in below P^4 . P^4 trapezoid, with somewhat reduced posterior part of the protocone. Molars (M^1 and M^2) quadratic in contour at the base, posteriorly excavated. M^3 three-cusped with strongly reduced talon.

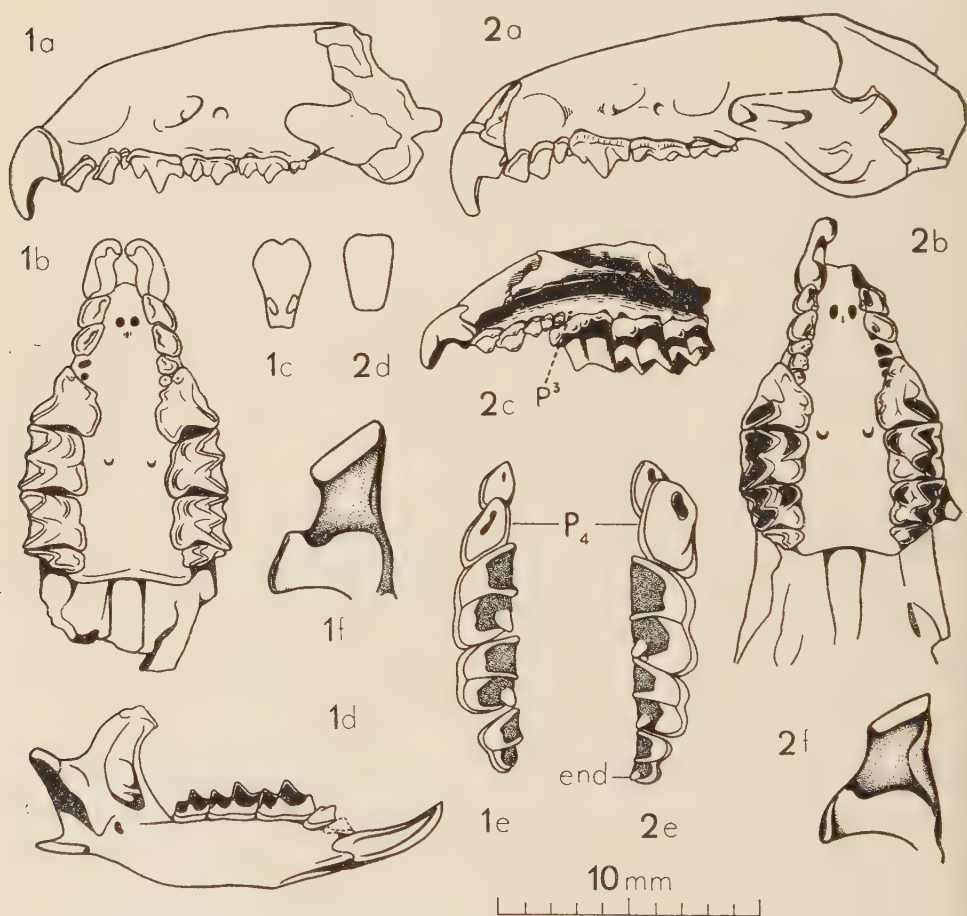


Fig. 4. — 1 *Beremendia fissidens* (Petényi)

a specimen No. 710, rostral fragment of skull, side view, b ventral view, c outline of nasal foramen, d inner view of left mandible (spec. No. 80), e lower tooth-row without I, f condyloid process from behind.

2 *Blarinoides mariae* n.sp. paratype

a specimen No. 800, rostral fragment of skull, side view, b ventral view, c right half of maxilla with tooth-row I^1 — M^2 and sixth alveole (P^3), d contour of nasal foramen, e lower tooth-row without I, end entoconid, f condyloid process from behind.

Remark: Condyloid processes and lower tooth-row enlarged twice as much as the other illustrations.

Dimensions of 5 skulls (in mm):

Skulls —————→	1	2	3	4	5
Specimen Nos. —————→	803	800	804	801	802
Length of:					
I ¹ -M ³	15.0	15.4	—	—	—
I ¹ -M ²	14.0	14.2	—	—	—
P ⁴ -M ¹	—	5.7	5.7	5.6	5.6
P ⁴ -M ³	9.0	—	—	—	—
M ¹ -M ³	6.0	6.0	6.0	5.8	—
M ¹ -M ²	—	5.0	—	—	—
M ² -M ³	3.5	3.3	3.3	3.2	—
M ³	1.0	—	1.1	1.0	—
Interorbital distance	7.7	8.0	7.8	—	—
Infraorbital distance	6.6	6.5	6.6	—	6.4
Distance between interorbital fossa and infraorbital foramen	3.8	3.8	4.3	—	3.7
Length of nasal bone	10.6	—	—	—	—
Individual age of specimen	y o u n g			old	young

Dimensions of 14 mandibles — see Table 5.

Remarks. — Slight differences in size between *Blarinoides mariae* n. sp. and *Beremendia fissidens* (Petényi) may suggest their identity. Nevertheless such morphological differences as the three-cusped lower incisor, differently shaped condyloid process, number of unicuspid upper teeth, size of P₄ and M₃ with five cusps bar the assignment of our specimens to genus *Beremendia* Kormos. The same characters make necessary the erection of a new genus for the Węże form. A comparative study of the Węże specimens with the recent and fossil *Blarina brevicauda* (Say) and *Bl. brevicauda kirtlandi* Bole & Maultrop (Hibbard, 1950, 1953) has shown considerable structural analogies of the particular mandibular and cranial elements, i. e. the arrangement of unicuspid teeth, structure of lower incisor, morphology of articular facets of the condyloid process, also structure of the coronoid process. Living species of genus *Blarina* Gray differ, however, in smaller dimensions, presence of a stronger marked spine in masseter crest, less developed P₄, larger I³ in relation to I², minute P², laterally hardly visible, and finally the usual absence on M₃ of the entoconid.

The presence is noteworthy in some of our specimens of an accessory P³ alveole placed immediately below P⁴. This alveole is not associated with a functional tooth and it has not been encountered simultaneously in both jaws. Similar anomalies of dentition have already been pointed out by Kormos (1934) in the description of *Sorex margaritodon*. This is certainly an atavistic feature, rarely noted in shrews.

T a b l e 5
Blarinoides mariae n.sp. — dimensions of mandibles (in mm)

Mandibles —————→	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Specimen Nos. —————→	178	342	180x	151	69x	51	47	343	200	1	66	84	62	360
Total length of mandible	15.0	16.2		—	—	—	—	—	—	—	—	—	—	—
Cardinal length of mandible	10.7	11.8	11.6	10.8	10.8	10.8	11.5	—	—	—	—	—	—	—
Length of:														
I-M ₃	10.7	10.6	—	—	—	—	—	—	10.7	11.3	—	—	—	—
C-M ₃	7.3	7.2	7.1	7.2	—	—	—	7.5	7.4	7.8	—	—	—	—
P ₄ -M ₃	6.6	6.6	6.3	—	—	—	—	6.8	6.5	7.0	6.8	6.6	—	—
M ₁ -M ₃	5.3	5.5	5.3	5.5	5.7	5.7	5.3	5.5	5.3	5.8	5.3	5.5	—	—
M ₁ -M ₂	4.0	4.3	3.8	4.2	4.2	4.3	4.2	4.3	4.2	4.5	4.0	—	—	—
M ₂ -M ₃	3.2	3.2	3.3	3.3	3.3	3.3	3.0	3.2	3.0	3.3	3.0	3.2	3.1	—
M ₃	1.5	1.3	1.3	1.3	1.3	1.4	—	1.5	1.2	—	1.5	—	1.3	1.2
Height of mandible below M ₂	2.2	2.3	2.5	2.5	2.3	2.5	2.2	2.6	2.3	2.7	2.0	2.5	2.1	2.5
Thickness of mandible below M ₂	1.5	1.4	1.3	1.5	1.5	1.5	1.5	1.4	1.6	1.5	1.5	1.6	1.3	1.5
Height of coronoid process	6.3	—	6.3	—	6.3	6.5	—	—	—	—	—	—	6.3	6.8
Height of condyloid process	4.3	4.5	—	4.0	4.2	4.5	4.3	4.6	—	—	4.0	—	4.0	4.8
Height between articular facets of condyloid process	3.6	—	—	3.3	3.5	3.6	3.8	—	—	—	3.3	—	3.6	3.8
Individual age of specimen		y	o	u	n	g	o	l	y	o	u	n	g	

Genus *Neomys* Kaup, 1892*Neomys soriculoides* n. sp.

(pl. III, fig. 4 a-c; text-fig. 5 C, D)

Holotypus: specimen No. 160-left and specimen No. 700-right mandibles with complete dentition and articular processes. Specimen No. 1109, rostral part of skull with complete maxillary teeth. Mandibles and skull belonging to the same individual.

Derivatio nominis: *soriculoides* — after its resemblance with genus *Soriculus* Blyth.

Material. — About 130 specimens, mostly left and right mandibles with incomplete dentition, rostral fragments of skulls in various state of preservation, numerous detached lower and upper teeth, also long bones of limbs and vertebrae.

Description of holotype. — *Mandible*. Incisor relatively short, with the end somewhat blunt, two lobes just behind the tip, cingulum broad at the base. Canine small, very closely applied to I and P₄, one-cusped. Premolar distinctly two-cusped, with cingulum more or less postero-lingually extended. M₁ and M₂ with five cusps. M₃ half the size of M₁, with four cusps and with strongly reduced talonid. In all molars cingulum well developed, delicate, labially more conspicuous. Protoconids and hypoconids directed to the front of the mandible. Coronoid process low, slender, with a small step. Masseter crest subcircular, lower end closely applied to ascending ramus, without producing an outwardly flexed spine. An arcuate thickening extends downwards and towards the upper articular

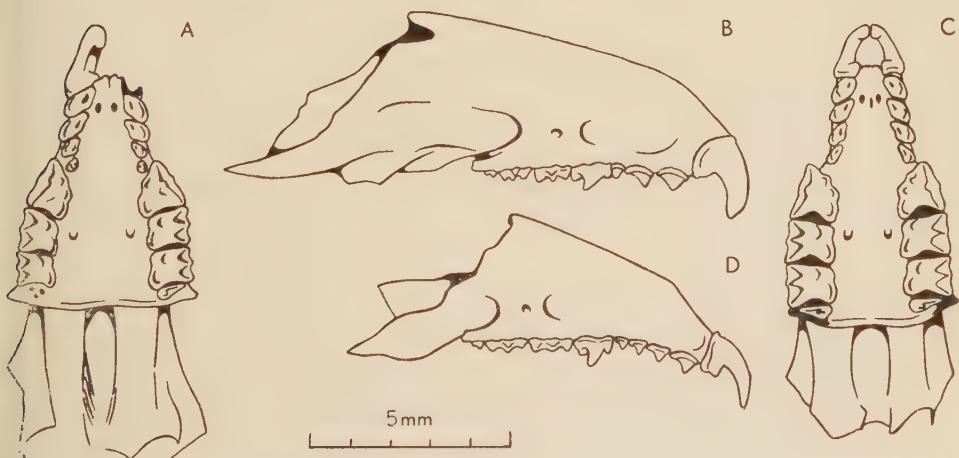


Fig. 5 — A & B *Petenyia hungarica* Kormos (spec. No. 1009): A ventral view of rostral fragment of skull, B side view. C & D *Neomys soriculoides* n. sp., holotype (spec. No. 1109): C ventral view of rostral fragment of skull, D side view.

facet of the condyloid process from the lower end of the crest. The condyloid process of "*Neomys*" type, with upper articular facet oblique, narrow, slightly lingually elongated; the lower facet broad, labially narrower, lingually swollen out and downcurving. The upper line of this facet somewhat depressed centrally. The interarticular list distinctly narrower than lower surface, labially nearly rectilinear, lingually strongly excavated. Upper and lower sigmoid notches strongly excavated, the inferior less so. The angular process slender, pointed. Pterygoid fossa small, oval, at the top delimited by a transverse small sill. Over the sill the pit groove gradually shallowing towards the top. Mental foramen between the proto- and the hypoconid of M_1 , occasionally between roots of P_4 and M_1 . Tips of teeth with a dark reddish-brown pigmentation, more often as lighter spots. Horizontal ramus high, slightly tapering below M_2 . Ascending ramus meets horizontal ramus at an obtuse angle. Upper part of ascending ramus slightly inclined towards the front of the mandible.

Skull. In profile nasal area of skull similar to that in the living *Neomys fodiens* Pennant. Lacrimal foramen above the contact of M^1 with M^2 . Infraorbital foramen large, oval, placed over M^1 . Anterior palate foramina not discernible, probably between I^2 – I^2 . Posterior palate foramina between roots of M^1 – I^1 , I^2 and I^3 somewhat larger than the canine. P^1 pushed below by P^4 , laterally barely visible. All the unicuspid teeth with tiny knobs in the posterior part of the cingulum. P^4 distinctly higher than the other teeth, with protocone slightly extended posteriorly. M^1 and M^2 trapezoidal at the base, without structural differences. Posterior edges of these teeth usually distinctly excavated. M^3 small, with two or three cusps and reduced talon.

Dimensions of 3 skulls (in mm):

Skulls ———→	1	2	3
Specimen Nos.→	1109	1110	1111
Length of:			
I^1 – M^3	7.2	7.0	7.3
I^1 – P^4	3.4	3.2	3.4
M^1 – M^3	3.9	4.1	4.2

Dimensions of 10 mandibles — see Table 6.

Remarks. — The morphology of horizontal ramus and articular processes in the Węże specimens is similar to that of recent *N. anomalus milleri* Mottaz (Dehnel, 1950). These specimens, however, differ from all known living forms of genus *Neomys* Kaup in smaller cardinal length of the mandible, more massive mandible and absence of entoconid on the

Table 6
Neomys soriculoides n. sp. — dimensions of mandibles (in mm)

Mandibles →	1	2	3	4	5	6	7	8	9	10
Specimen Nos. →	160	700	87	600	S	18	60	57	332	100
Total length of mandible	10.2	10.3	9.6	10.2	11.2	10.2	9.8	10.1	10.0	9.6
Cardinal length of mandible	8.1	8.0	8.2	8.0	7.8	8.0	7.6	8.2	8.2	7.8
Length of:										
I-M ₃	6.5	6.6	5.2	6.5	6.3	6.6	6.3	6.6	6.5	6.3
C-M ₃	4.6	4.7	4.5	4.6	4.6	4.6	—	4.5	—	—
P ₄ -M ₃	4.2	4.3	4.2	4.0	4.2	4.0	—	4.0	—	—
M ₁ -M ₃	3.6	3.6	3.5	3.6	3.6	3.5	3.5	3.6	3.8	3.5
M ₁ -M ₂	2.7	2.8	2.6	2.7	2.6	2.8	2.6	—	2.6	2.8
M ₂ -M ₃	2.2	2.2	2.2	2.3	2.3	2.2	2.2	—	2.6	2.2
M ₃	1.0	1.0	1.0	1.0	1.0	—	1.0	—	1.0	1.0
Height of mandible below:										
M ₁	1.5	1.5	1.6	1.5	1.3	1.3	1.3	1.5	1.4	1.3
M ₂	1.3	1.3	1.5	1.3	1.3	1.3	1.4	1.4	1.3	1.3
M ₃	1.3	1.3	1.4	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Thickness of mandible below M ₂	0.8	0.8	1.0	0.8	0.8	0.8	0.8	0.8	0.9	0.8
Height of coronoid process	4.1	4.0	4.1	3.8	—	3.8	4.0	4.0	4.2	3.8
Height of condyloid process	3.0	2.9	2.9	2.8	3.0	2.5	2.8	3.1	3.0	2.3
Distance between articular facets of condyloid process	2.5	2.4	2.3	2.2	2.0	2.5	2.1	2.3	2.3	2.2
Individual age of specimen	young		old	young		old	young			old

M₃ talonid. The skulls are likewise different inasmuch that their rostral parts are more reduced: I² and I³ larger than the canine and P¹, while M³ has a very much reduced talon.

The Upper Pliocene *N. newtoni* Hinton and *N. browni* Hinton (Hinton, 1911) differ from the here studied remains in that their mandibular incisor is longer and with one lobe, the interarticular list more strongly notched, the entoconids on M₃ less conspicuous.

The most striking resemblance is noted between the Węże specimens and *Soriculus kubinyi* Kormos, 1934. The latter, however, has a distinct entoconid on M₃ (Kowalski, 1956, p. 354), faintly indicated posterior lobe on the cutting edge of the lower incisor, lacrimal foramen placed over

the mesostyle of M^1 , the articular facet of the coronoid process smooth, without a step; P^1 strongly reduced and not closed in by C and P^4 . Features common to both these species are: general morphology of the horizontal ramus, pattern of articular facets of the condyloid process and interarticular list, also proportions of lower molars. Owing to inadequate descriptions and meagre measurement data of forms from Villány and Podlesice, their closer correlation with the here described Węże specimens is not possible.

Certain resemblances are also observable in forms from Choukoutien (Zdansky, 1928) and Sackdillinger Höhle (Heller, 1930a), described as *Neomys* sp. only. Their incomplete descriptions, however, do not permit closer comparison with the Węże specimens. *Neomys bohlini* Young (Young 1934; Pei, 1936), in spite of the reduced talonid in M_3 , differs in a more slender mandible and strongly shortened lower incisor, with one lobe on the cutting edge only.

Genus *Beremendia* Kormos, 1934

Beremendia fissidens (Petényi, 1864)

(pl. III, fig. 7; text-fig. 4: 1 a-f)

1864. *Crossopus fissidens* Petényi; J. S. Petényi, Hátragyott Munkai..., p. 60, pl. 5 a-p.
 1955. *Blarina ucrainica* Pidopličko; J. G. Pidopličko, Novye danye..., p. 990-991.
 1956. *Blarina ucrainica* Pidopličko; J. G. Pidopličko, Materiali..., p. 133.
 1958. *Blarina ucrainica* Pidopličko; K. A. Tatarinov, Znachidki..., p. 81-84, fig. 1-2b, 3-a.
 1958. *Beremendia fissidens* (Petényi); K. Kowalski, An early Pleistocene..., p. 13-14, fig. 4 (here further synonymy).

Material. — About 200 complete and fragmentary specimens; 24 well preserved mandibles, 14 rostral parts of skulls with more or less complete dentition; numerous detached lower and upper teeth; numerous long bones of limbs, also other skeletal elements.

Dimensions of 7 skulls and 7 mandibles — see Table 7.

Remarks. — Morphologically the Węże specimens do not differ from conspecific forms described from the early Pleistocene of central Europe. The slight differences in size that have been noted are probably due to different measurement methods, as well as to strong individual variations. The more significant dissimilarities consist in the somewhat different structure of the coronoid process (its proximal part is with a step and an oblong sill running parallel to the posterior edge of the process), in slightly different pattern of masseter crest, structure of the condyloid

Table 7
Beremendia fissidens (Petényi) — dimensions of skulls and mandibles (in mm)

Skulls →	1	2	3	4	5	6	7
Specimen Nos. →	710	700a	712	701	707	706	704
Length of I ¹ -M ³	16.2	15.4	—	—	—	—	—
Length of M ¹ -M ³	6.2	6.5	6.3	6.6	6.2	6.2	6.3
Interorbital breadth	7.5	7.5	8.1	7.8	7.2	—	7.0
Infraorbital breadth	6.2	6.3	6.6	6.3	6.2	6.2	5.8
Length of nasal bones	—	—	10.0	—	10.6	—	—
Individual age of specimen	young			old		young	

Mandibles →	1	2	3	4	5	6	7
Specimen Nos. →	80	36	81	146	3	40	83
Total length of mandible	16.5	16.2	16.3	17.0	16.0	—	—
Cardinal length of mandible	13.2	12.8	13.0	13.6	13.2	13.0	13.3
Length of I-M ₃	10.6	10.5	10.8	11.2	—	—	—
Length of M ₁ -M ₃	5.8	5.4	5.8	6.0	—	6.0	5.9
Height of mandible below M ₂	2.6	2.4	2.4	2.3	2.5	2.3	2.3
Thickness of mandible below M ₂	1.6	1.5	1.5	1.5	1.6	1.5	1.5
Height of coronoid process	6.3	5.8	6.2	—	—	6.0	6.2
Height from base of mandible to apex of protoconid in M ₂	4.0	4.1	4.1	3.9	4.1	4.1	4.0
Individual age of specimen	young			old		young	

process with its articular facets, finally in a different position of mental foramen dependent on the individual age of the specimen. Anterior palate foramens are placed between the roots of I²⁻², but not between the canines as stated by Kormos (1934, p. 299). The nasal foramen, as compared to that in *Blarinoides mariae* n. sp., is distinctly narrow at the base, expanding towards the top, also about twice as high as wide.

The occurrence is noteworthy in the mandibular tooth-row of an accessory P² alveole not accompanied by a functional tooth. Similarly as in *Blarinoides mariae* n. sp. this alveole does not occur simultaneously in both halves of the jaws.

The remains of a large shrew have been described from China (Zdansky, 1928) under the name of *Neomys sinensis*. Close similarities noted in its structure and mandibular dimensions to the European genus *Beremendia* Kormos indicate that we are dealing here with a congeneric form. This agrees with the statement of Kretzoi (1956) assigning this species to genus *Beremendia* and identifying it as *B. sinensis* (Zdansky).

Specimens of a large shrew discovered at Czortków (Pidopličko, 1955,

1956) and in Gorishna Vygnanka (Tatarinov, 1958) have been identified as *Blarina ucrainica* Pidopličko. On their structure and dimensions, however, they are doubtlessly referable to genus *Beremendia* and species *B. fissidens* (Petényi). Inadequate descriptions and meagre statistical information do not permit their separation into a new species of *Beremendia* Kormos.

Close resemblances are observable between the European species *B. fissidens* (Petényi) and the Pliocene *Paracryptotis rex* Hibbard, 1950 from America. On the same number of unicuspid, similar mandibular incisors without lobes, and M_3 with four cusps, it is supposed that these two species are related. They differ in general size (*Paracryptotis rex* Hibbard being smaller than *Beremendia fissidens* (Petényi)) and in structure of maxillar molars (posterior edges of teeth in first species are more weakly emarginated than in second species).

Genus *Petenyia* Kormos, 1934

Petenyia hungarica Kormos, 1934

(pl. III, fig. 3 a-c; text-fig. 5 A-B)

1930. *Petenyia hungarica* Kormos; T. Kormos, Beiträge..., p. 57, nomen nudum.
 1934. *Petenyia hungarica* Kormos; T. Kormos, Neue Insektenfresser..., p. 301-303, fig. 34-35.
 1943. *Petenyia neglecta* Kretzoi; M. Kretzoi, Bemerkungen..., p. 607-608, fig. 1.
 1956. *Petenyia hungarica* Kormos; K. Kowalski, Insectivores..., p. 352-353, pl. 1, fig. 9, 10; textfig. 1-b (here further synonymy).
 1958. *Petenyia hungarica* Kormos; K. Kowalski, An early Pleistocene..., p. 14-15.

Material. — About 50 mandibles, often lacking the canine and P_4 , and articular process; several fragmentary maxilla; numerous detached lower and upper teeth, also long bones of limbs.

Dimensions of 5 skulls and 8 mandibles — see Table 8.

Remarks. — Mandibular structure in the Węże specimens is analogous to that in Hungarian forms (Kormos, 1934). In our specimens, however, the lower articular facet of the condyloid process is stronger and wider, while its interarticular list is linguallly less conspicuously notched. Skull morphology in these species is essentially similar to that in *Beremendia fissidens* (Petényi) though the skulls in *P. hungarica* are notably smaller. Other characters, such as the coronoid process with a well marked posterior step, masseter crest provided with a peculiar outwardly protruding spine and an elongate sill on the lingual side of the process, are all features distinguishing the Węże specimens.

Table 8

Petenyia hungarica Kormos — dimensions of skulls and mandibles (in mm)

Skulls →	1	2	3	4	5
Specimen Nos. →	1009	1010	1011	1012	1013
Length of I ¹ -M ³	7.4	7.0 a*	7.1	7.3 a	—
Length of M ¹ -M ³	3.6	3.8 a	3.7	3.6 a	3.7
Interorbital breadth	4.6 ?*	—	—	—	—
Infraorbital breadth	3.8 ?	—	—	—	—
Individual age of specimen	y o u n g			o l d	young

Mandibles →	1	2	3	4	5	6	7	8
Specimen Nos. →	48	9	88	303	314	165	345	156
Total length of mandible	10.2	10.2	10.2	10.2	10.3	10.4	10.6	10.2
Cardinal length of mandible	8.2	8.0	8.0	8.3	8.3	8.5	8.4	8.2
Length of I-M ₃	6.5	6.5	6.6	6.6	6.5	6.5	6.6	6.4
Length of M ₁ -M ₃	3.5	3.3	3.5	3.3	3.3	3.4	3.3	3.3
Height of mandible below M ₂	1.5	1.5	1.6	1.6	1.5	1.5	1.5	1.6
Thickness of mandible below M ₂	0.8	0.8	0.8	0.9	0.9	0.8	0.9	0.9
Height of coronoid process	4.5	4.3	4.5	4.5	4.5	4.3	4.3	4.2
Individual age of specimen	y o u n g			o l d		young	o l d	young

* a — measured along the alveoles, ? — measurement uncertain.

During the examination of fairly copious and well preserved conspecific material the writer has been able to ascertain that the mental foramen always occurs singly, not in pairs, as stated by Kowalski (1956), and is placed between the para- and protoconid of M₁; last molar has four cusps, its talonid being provided with a hypoconid but not with a hypoconulid, as described by Kormos (1934); height figures for the horizontal ramus of the mandibles are greatly overestimated by Kormos, actually being 1.3 to 1.6 mm; total length of tooth-row, computed by Kowalski (1956, p. 353) as 8.4 mm, is likewise exaggerated. It probably refers to the cardinal length of mandible.

Species *P. stehlini* described by Kretzoi (1943) most likely belongs to a different genus, while a mandible of *P. neglecta* (Kretzoi, l. c.) is identical in structure and dimensions with *P. hungarica* Kormos. Owing to inadequate descriptions and meagre measurement data it is not possible reliably to identify it as a new species. Analogous specimens also occur among the Węże material within the rich population of *Petenyia hungarica* Kormos. Hence, the inclusion of species *P. neglecta* into the synonymy of *P. hungarica* seems more correct.

Subfamily **Crocidurinae** Milne-Edwards, 1864-1874Genus *Crocidura* Wagler, 1832*Crocidura* sp.

(pl. IV, fig. 4 a-e)

Material. — Five fragmentary mandibles with incomplete dentition; fragments of articular processes and fairly numerous detached upper and lower teeth; skulls not known.

Description. — Lower incisor relatively short, with smooth cutting edge, occasionally with faintly marked lobes. Tip of tooth upcurved and somewhat blunt, probably owing to strong wear. Cingulum at the base of tooth, not very distinct. Canine one-cusped, „flat“, basally broad. Premolar likewise one-cusped, narrow, with cone higher than that in the canine. Both these teeth with distinct cingula. M_1 and M_2 five-cusped, with high protoconids extending to the distal part of the mandible. M_3 has a talonid reduced to one cusp. In molars the cingulum labially more conspicuous. Coronoid process broad at the base, slender proximally, gradually tapering towards the top. Anterior edge of the process gently anteriorly flexed. Masseter crest reduced to a small labial knob at top of coronoid process. Condylod process low, distinctly protruding towards the distal part of the mandible. Upper articular facet slightly obliquely set in relation to the lower facet, narrower and shorter. The lower facet gently lingually curved downwards. Interarticular list broad, slightly lingually notched. Pterygoid fossa large, triangular, broad, delimited in its apical part. Upper and lower notches strongly depressed. Mental foramen between P_4 and M_1 . Pigmentation of teeth uniformly yellowish-brown from base to tip. Horizontal ramus mostly lower than the height of dental crowns. Jaw branches meet at a slightly obtuse angle.

Dimensions of two mandibles (in mm):

Mandibles →	1	2
Specimen Nos. →	334	428
Total length of mandible	ca. 11.1	ca. 10.6
Cardinal length of mandible	ca. 9.1	ca. 8.7
Length of I- M_3	7.2	6.4
Length of M_1 - M_3	3.8	3.3
Height of mandible below M_2	1.5	1.3
Thickness of mandible below M_2	0.8	0.8
Height of coronoid process	from 3.8 to 4.1	
Individual age of specimens	probably young	

Remarks. — Morphologically the Węże specimens do not differ from the essential type of mandibular structure in the living *Crocidura leucodon*

Hermann. In size, however, they are smaller than this species. In structure of the coronoid process and shape of the canine they seem to approach the Chinese late Pliocene species *C. wongi* Pei, 1936. From the latter they differ in arrangement of teeth and structure of tooth tips. In some features of the mandible the Węże specimens likewise resemble *C. kormosi* Schlosser (Miller, 1927), *C. kornfeldi* Kormos, 1934, and *Crocidura* sp. (Pei, 1931). Incomplete measurements and inadequate descriptions, however, do not allow closer comparative studies. The fragmentary condition of the discussed fossil remains provides no reliable evidence for their separation into a new species. Genus *Crocidura* Wagler has been recovered from the lower layers of the Węże breccia and probably belongs to an early Pliocene form. This genus has been recorded already from the Miocene of Europe.

Genus *Suncus* Ehrenberg, 1832-1833

Suncus pannonicus (Kormos, 1934)

(pl. III, fig. 1 a-b; pl. IV, fig. 2 a-b)

1934. *Pachyura pannonica* Kormos; T. Kormos, Neue Insektenfresser..., p. 306, fig. 38.
 1937. *Pachyura hungarica* Kormos; T. Kormos, Zur Frage..., p. 320, nomen nudum.
 1949. *Pachyura pannonica* Kormos; M. Friant, Les Musaraignes..., p. 19.
 1956. *Suncus* cf. *pannonicus* Kormos; K. Kowalski, Insectivores..., p. 354-356, pl. 2, fig. 2; textfig. 1-e.

Material. — Five right and left mandibles with incomplete dentition, mandibular fragments lacking C and P₄; also fragmentary articular processes; numerous detached teeth and long bones of limbs.

Dimensions of 5 mandibles (in mm):

Mandibles →	1	2	3	4	5
Specimen Nos. →	183	130	188	223	325
Total length of mandible	7.0	7.0	7.0	6.8	—
Cardinal length of mandible	5.5	5.3	5.3	5.4	—
Length of I-M ₃	4.6	—	4.6	4.8	—
Length of M ₁ -M ₃	2.5	2.8	2.5	2.6	2.7
Height of mandible below M ₂	0.6	0.8	0.7	0.7	0.8
Thickness of mandible below M ₂	0.6	0.6	0.5	0.6	0.7
Height of coronoid process	2.6	2.8	2.5	2.6	2.6
Individual age of specimens	young		old	young	

Remarks. — Slight differences in shape of coronoid process (narrow and vertically ascending), in shape and course of masseter crest and of the interarticular list, suggest very strong individual variability of this small animal. Other characters, such as pterygoid fossa, shape of molars

and the premolar, position of mental foramen, are all analogous with those in Hungarian specimens. The differences consists in the incisor being with indistinct lobes on the cutting edge, the canine lower, M_3 less reduced, the talonid with one cusp only.

Suncus zelceus n. sp.

(pl. III, fig. 2 a-b; pl. IV, fig. 1 a-c)

Holotypus: specimen No. 502, right mandible with complete dentition and damaged coronoid process.

Derivatio nominis: *zelceus* — after Zelce, the name of the hill near Weże, where the Tertiary bone breccia has been discovered.

Material. — 20 more or less satisfactorily preserved specimens, mostly fragmentary; the only cranial fragment (rostral part) is probably referable to this species.

Description. — Mandibles minute, delicate, shorter than in *S. pannonicus* Kormos, 1934. Incisor short, with two very faintly indicated lobes on the cutting edge. Canine small, one-cusped. Premolar higher than the canine, one-cusped. Both teeth of about equal length very closely applied to each other. M_1 and M_3 similar in structure to those in *S. pannonicus*, of smaller size, with broader and rather bluntly terminating tips. M_3 has a strongly reduced talonid with poorly recognizable hypoconid. Teeth seemingly "white", but lightly pigmented at tips. Cingulum quite distinct in all teeth, delicate, slightly swollen below the protoconids. Coronoid process basally broad, gradually tapering towards the top, in the proximal portion slightly anteriorly flexed. Masseter crest of semicircular shape, as in the living *Sorex minutus* L. Articular facet of the process with a small step. The condyloid process low; the upper articular facet very short, slightly oblique, the lower strongly linguallly developed, parallel to the upper facet. Interarticular list narrow, strongly expanding towards the lower articular facet, linguallly distinctly notched. Angular process short, needle-like. Pterygoid fossa triangular, fairly deep, at top delimited by a sill. Mental foramen below the anterior root of M_1 , occasionally between roots of P_4 and M_1 . Mandibular rami meet at a nearly right angle. Height of horizontal ramus below M_1 somewhat greater than below the other molars. Upper and lower sigmoid notches quite distinct and depressed.

Dimensions of 6 mandibles — see Table 9.

Remarks. — Strong reduction of the talonid occurring in *Suncus pannonicus* (Kormos) and *S. zelceus* n. sp. suggests the separation of these two species from the living *S. etruscus* (Savi) (Miller, 1912). The latter

T a b l e 9
Suncus zelceus n.sp. — dimensions of mandibles (in mm)

Mandibles —————→	1	2	3	4	5	6
Specimen Nos. —————→	502	402	2x	559	2y	602
Total length of mandible	6.6	6.7	6.6	—	—	—
Cardinal length of mandible	5.0	5.1	5.0	—	—	—
Length of:						
I-M ₃	4.3	4.4	4.2	—	—	—
C-M ₃	3.1	3.3 <i>a</i> *	3.1	3.1	—	—
P ₄ -M ₃	2.9	3.1 <i>a</i>	2.8	2.9	2.9	3.0
M ₁ -M ₃	2.5	2.6 <i>a</i>	2.5	2.4	2.4	2.5
M ₁ -M ₂	1.7	1.9	1.8	1.8	1.8	2.0
M ₂ -M ₃	1.4	1.5 <i>a</i>	1.5	1.5	1.6	1.4
M ₃	0.8	0.6 <i>a</i>	0.7	0.5	0.6	0.5
Height of mandible below M ₂	0.6	0.6	0.6	0.5	0.6	0.6
Thickness of mandible below M ₂	0.5	0.4	0.5	0.5	0.4	0.4
Height of coronoid process	2.3	2.4	2.5	2.3	2.6	2.3
Height of condyloid process	1.8	1.7	1.8	—	2.0	1.6
Distance between the articular facets of condyloid process	1.1	1.1	1.2	—	1.2	1.2
Individual age of specimen	y o u n g		old	y o u n g		

a — measured along the alveoles.

is distinguished by notably larger dimensions. The two fossil species differ not only in size, but also in the shape of the coronoid process, pterygoid fossa, structure of lower incisor and of molars. In *S. zelceus*, the pterygoid fossa is not large, at the top delimited by a fairly conspicuous sill, the incisor is short, with two indistinct lobes, while the molars are relatively somewhat longer than those in *S. pannonicus* (Kormos).

*Palaeozoological Laboratory
of the Polish Academy of Sciences
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REFERENCES

- ALLEN, M. G. 1938. The Mammals of China and Mongolia. — *Nat. Hist. Centr. Asia*, **11**, 1, 1-620, New York.
- BOBRINSKIJ, N. A., KUZNECOV, B. A. & KUZJAKIN, A. P. 1944. *Opredelitel mlekopitajuščich SSSR*. Gos. Izdat. Sov. Nauka, 1-58, Moskva.
- BOHLIN, B. 1942. The fossil Mammals from the Tertiary Deposit of Taben-buluk, Western Kansu. I: Insectivora and Lagomorpha. — *Palaeont. Sinica*, N. ser. C, **8a**, 14-28, Nanking.
- BOROWSKI, S. & DEHNEL, A. 1952. Materiały do biologii Soricidae. — *Ann. Univ. M. C.-S.*, **7**, 6, 305-448, Lublin.

- BRUNNER, G. 1934. Eine präglaziale Fauna aus dem Windloch bei Sackdilling (Oberpfaltz). — *N. Jb. Min. etc.*, B, **71**, 303-328, Stuttgart.
- 1950. Das Gaisloch bei Münzighof (Mfr.) mit Faunen aus dem Altdiluvium und aus jüngeren Epochen. — *Ibidem*, B, **91**, 1-34.
- CZYŻEWSKA, T. 1958. Dwa zęby nosorożca *Dicerorhinus* z brekcji kostnej z Węzów koło Działoszyna (Two teeth of *Dicerorhinus* from the bone breccia at Węzów near Działoszyn (Poland)). — *Acta Palaeont. Pol.*, **3**, 1, 49-58, Warszawa.
- DEHNEL, A. 1949. Badania nad rodzajem *Sorex* L. (Studies on the genus *Sorex* L.). — *Ann. Univ. M. C. S.*, **4**, 2 (C), 17-102, Lublin.
- 1950. Badania nad rodzajem *Neomys* Kaup (Studies on the genus *Neomys* Kaup). — *Ibidem*, **5**, 1 (C), 1-63.
- DEPÉRET, CH., 1887. Recherches sur la succession des faunes de Vertébrés Miocènes de la Vallée du Rhône. — *Arch. Mus. Hist. Nat.*, **4**, 46-313, Lyon.
- DOBSON, G. E. A. 1882-90. A Monograph of the Insectivora systematic and anatomical, vol. 3, London.
- 1890. A synopsis of the genera of the family Soricidae. — *Proc. Zool. Soc.*, **4**, 49-51, London.
- EFREMOV, J. A. 1950. Tafonomija i geologičeskaja letopis'. — *Tr. Palaeont. Inst.*, **24**, 1, 1-172, Moskva.
- ELLERMAN, J. R., MORRISSON-SCOTT, T. S. C. 1951. Checklist of Palaearctic and Indian Mammals, 1753 to 1946. — *Brit. Mus. Nat. Hist.*, 1-810, London.
- FREUDENBERG, W. 1914. Die Säugetiere des älteren Quartärs von Mitteleuropa mit besonderer Berücksichtigung der Fauna von Hundsheim und Deutschaltenburg in Niederösterreich. — *Geol. Palaeont. Abh.*, N. F., **12**, 4/5, 1-219, Wien.
- FRIANT, M. 1949. Les Musaraignes (Soricidae) quaternaires et actuelles de l'Europe occidentale. — *Ann. Soc. Géol. Nord*, **67**, 222-269, Lille.
- GAILLARD, C. 1899. Mammifères miocènes nouveaux ou peu connus de la Grive-Saint-Alban (Isère). — *Arch. Mus. Hist. Nat.*, **7**, 2, 1-79, Lyon.
- GRASSÉ, P. P. 1955. Traité de Zoologie. Mammifères. **17**, 2, 1574-1712, Paris.
- HEIM DE BALSAC, H. 1940. Un Soricidé nouveau du Pléistocène; considérations paléobiogéographiques. — *C. R. Acad. Sci.*, **211**, 808-810, Paris.
- HELLER, F. 1930a. Eine Forest-Bed-Fauna aus der Sackdillinger Höhle (Oberpfaltz). — *N. Jb. Min. etc.*, Beil.-Bd., **63**, A, 247-298, München.
- 1930b. Jüngstpliozäne Knochenfunde in der Moggaster Höhle (Fränk. Schweiz). — *Cbl. Min. etc.*, Abb. **4**, B, 154-159, Stuttgart.
- 1933. Ein Nachtrag zur Forest-Bed-Fauna aus der Sackdillinger Höhle (Oberpfaltz). — *Ibidem*, **1**, B, 60-68.
- 1936a. Eine oberpliozäne Wirbeltierfauna aus Rheinhessen. — *N. Jb. Min. etc.*, Beil.-Bd., **76**, B, 99-160, München.
- 1936b. Eine Forest-Bed-Fauna aus der Schwäbischen Alb. — *Sitzber. Heidelb. Akad. Wiss., Math.-naturw. Kl.*, **2**, 1-29, Heidelberg.
- 1939. Kleinsäugerreste aus den altdiluvialen Sanden von Mauern. — *Ibidem*, **8**, 1-18.
- 1954. Neue Fundstellen altdiluvialer Desmanareste in Südwestdeutschland. — *N. Jb. Geol. Palaeont.*, **10**, 465-478, Stuttgart.
- HIBBARD, C. W. 1950. Mammals of the Rexroad Formation from Fox Canyon, Kansas. — *Contr. Mus. Paleont. Univ.*, **8**, 6, 113-192, Michigan.
- 1953. The Insectivores of the Rexroad fauna, Upper Pliocene of Kansas. — *J. Paleont.*, **27**, 1, 21-32, Menasha.
- 1955. The Jinglebob Interglacial (Sangamon?) fauna from Kansas and its climatic significance. — *Contr. Mus. Paleont. Univ.*, **12**, 10, 179-228, Michigan.

- HIBBARD, C. W. 1957. Notes on Late Cenozoic Shrews. — *Trans. Kansas Acad. Sci.*, **60**, 4, 327-336, Lawrence.
- 1958. Summary of North American Pleistocene Mammalian local faunas. — *Pap. Mich. Acad. Sci. Art. Lett.*, **43**, 3-32, Michigan.
- HINTON, M. A. C. 1911. The British Fossil Shrews. — *Geol. Mag.*, N. ser., **7**, 12, 530-539, London.
- JACKSON, H. H. T. 1928. A taxonomic review of the American Longtailed Shrews (Genera *Sorex* and *Microsorex*). — *North Amer. Fauna*, **51**, 1-238, Washington.
- KORMOS, T. 1911. *Canis* (*Cerdocyon*) *Petényii* n. sp. und andere interessante Funde aus dem Komitat Baranya. — *Mitt. Jb. Ungar. Geol. Reichsanst.*, **19**, 165-196, Budapest.
- 1913a. Trois nouvelles espèces fossiles des desmans en Hongrie. — *Ann. Mus. Nat. Hungar.*, **11**, 125-146, Budapest.
- 1913b. *Amblyopterus oligodon*, eine Spitzmaus aus den ungarischen Pliozän. — *Ibidem*, **24**, 370-391.
- 1930a. Diagnosen neuer Säugetiere aus dem oberpliozänen Fauna des Somlyóberges bei Püspökfürdő. — *Ibidem*, **27**, 237-246.
- 1930b. Beiträge zur Präglazialfauna des Somlyóberges bei Püspökfürdő. — *Allat. Közl.*, **27**, 40-62, Budapest.
- 1930c. *Desmana thermalis* n. sp., eine neue präglaziale Bisamspitzmaus aus Ungarn. — *Ann. Mus. Nat. Hungar.*, **27**, 1-19, Budapest.
- 1931. Über eine neuentdeckte Forest-Bed-Fauna in Dalmatien. — *Palaeobiologica*, **4**, 113-136, Wien.
- 1934. Neue Insektenfresser, Fledermäuse und Nager aus dem Oberpliozän der Villányer Gegend. — *Földt. Közl.*, **64**, 296-321, Budapest.
- 1935. Die perlzähne Spitzmaus (*Sorex margaritodon* Korm.) und das Anpassungsproblem. — *Allat. Közl.*, **32**, 1/2, 61-79, Budapest.
- 1937a. Zur Frage der Abstammung und Herkunft der quartären Säugetierfauna Europas. — *Festschr. Embr. Strand*, **3**, 287-328, Riga.
- 1937b. Revision der Kleinsäuger von Hundsheim. — *Földt. Közl.*, **67**, 23-171, Budapest.
- 1938. Zur näheren Kenntnis der oberpliozänen Bisamspitzmäuse Südungarns. — *Festschr. Embr. Strand*, **4**, 163-180, Riga.
- KOWALSKI, K. 1951. *Jaskinie Polski*, I. P. Muz. Archeol., 1-466, Warszawa.
- 1956. Insectivores, bats and rodents from the early Pleistocene bone breccia of Podlesice near Kroczyce, Poland (Owadożerne, nietoperze i gryzonie wczesnoplejstoczeńskiej brekcji kostnej z Podlesic koło Kroczyce). — *Acta Palaeont. Pol.*, **1**, 4, 331-394, Warszawa.
- 1958. An early Pleistocene fauna of small mammals from the Kadzielnia Hill in Kielce, Poland (Wczesnoplejstoczeńska fauna drobnych ssaków z Kadzielni w Kielcach). — *Ibidem*, **3**, 1, 1-47.
- KRETZOI, M. 1937/38. Die Raubtiere von Gombaszög nebst Übersicht der Gesamtfauna. — *Ann. Mus. Nat. Hungar.*, **31**, 88-157, Budapest.
- 1941a. Die unterpleistozäne Säugetierfauna von Betfia bei Nagyvarád. — *Földt. Közl.*, **71**, 308-335, Budapest.
- 1941b. Weitere Beiträge zur Kenntnis der Fauna von Gombaszög. — *Ann. Mus. Nat. Hist. Hungar.*, **34**, 105-139, Budapest.
- 1943. Bemerkungen über *Petényia*. — *Földt. Közl.*, **73**, 607-608, Budapest.
- 1956a. Die altpleistozänen Wirbeltierfaunen des Villányer Gebirges. — *Geol. Hungar.*, S. *Palaeont.*, **27**, 1-264, Budapest.

- KRETZOI, M. 1956b. Quaternary geology and the vertebrate fauna. — *Acta Geol. Hungar.*, **2**, 1-2, 67-77, Budapest.
- KUBIK, J. 1951. Analysis of the Puławy population of *Sorex araneus* L. — *Ann. Univ. M. C.-S.*, **5**, 11, 335-372, Lublin.
- MIGULIN, O. O. 1933. Zwiri URSR. Akad. Nauk URSR., Inst. Zool. Biol. 1-422, Kijiv.
- MILLER, C. S. 1912. Catalogue of the Mammals of Western Europe. Brit. Mus., 1-1019, London.
- 1927. Revised determinations of some Tertiary Mammals. — *Palaeont. Sinica*, **5**, 2, 1-20, Peking.
- MLYNARSKI, M. 1953. Żółw błotny *Emys orbicularis* (L.) z pliocenu Polski (Pond tortoise *Emys orbicularis* (L.) from the Pliocene of Poland). — *Acta Geol. Pol.*, **3**, 1, 545-572, Consp. 168-170, Warszawa.
- 1955. Żółwie z pliocenu Polski (Tortoise from the Pliocene of Poland). — *Ibidem*, **5**, 2, 161-214, Consp. 46-62.
- 1956 a. Lizards from the Pliocene of Poland (Jaszczurki z pliocenu Polski). — *Acta Palaeont. Pol.*, **1**, 2, 135-152, Warszawa.
- 1956b. On a new species of Emydid-tortoise from the Pliocene of Poland (Nowy gatunek żółwia z pliocenu Polski). — *Ibidem*, **1**, 2, 153-164.
- OGNEV, S. J. 1928. Zveri vostočnoj Evropy i severnoj Azii, I, 1-631, Moskva.
- 1929-30. Geografičeskoe rasprostranenie nasekomojadnych v svjazi s ich paleontologiej. — *Izv. Assoc. Nauč.*, Inst. fiz. mat. Mosk. Gos. Univ., **2**, 1, 107-134, Moskva.
- 1934. Materialien zur Systematik, Morphologie und Zoogeographie der Paläarktischen Spitzmäuse. — *Zool. Anz.*, **105**, 3/4, 77-85, Leipzig.
- 1951. Očerki ekologii mlekopitajuščich. — *Mosk. Obšč. Ispyt. Prir.*, **26**, 11, 1-252, Moskva.
- PASA, A. 1948. I mammiferi di alcune antiche brecce Veronesi. — *Mem. Mus. Civ. Stor. Nat.*, **1**, 1-111, Verona.
- 1950. I depositi Quaternari del Ponte di Veja. II: La fauna. — *Ibidem*, **2**, 241-308.
- PEI, C. W. 1931. Mammalian remains from locality 5 at Choukoutien. — *Palaeont. Sinica*, **C**, **7**, 7-8, Peking.
- 1936. On the Mammalian remains from locality 3 at Choukoutien. — *Ibidem*, **C**, **7**, 5, 1-108.
- 1940. The Upper Cave fauna of Choukoutien. — *Ibidem*, **C**, **10**, 125, 9-11.
- PETĚNYI, S. J. 1864. Hátragyott Munkai. — *Magyar Tudományos Akad.*, **1**, 1-130, Pest.
- PIDOPLIČKO, I. G. 1955. Novyje dannye o faune pozvonočnych antropogennych otloženij Tarnopolskoj Oblasti. — *Dokl. Akad. Nauk SSSR*, **100**, 989-991, Moskva.
- 1956. Materiali do vivčenia minulich faun URSR. — *Akad. Nauk URSR*, **2**, 132-133, Kijiv.
- PIVETEAU, J. 1958. Traité de Paléontologie. **6**, 2, 822-918, Paris.
- POPLEWSKI, R. 1948. Anatomia ssaków. **2**, 1-690, Warszawa.
- SAMSONOWICZ, J. 1934. Zjawiska krasowe i trzeciorzędowa brekcja w Węzach pod Działoszynem (Sur les phénomènes karstiques de Węże près de Działoszyn sur la Warta). — *Zab. Przyr. Nieoż. Ziem R. P. (Mónum. Nat. Inanimée Rép. Pol.)*, **3**, 147-158, Warszawa.
- SCHAEFFER, H. 1935. Studien an mitteleuropäischen Kleinsäugetern mit besonderer Berücksichtigung der Rassenbildung. — *Arch. Naturg.*, **N. F.**, **4**, 535-590, Leipzig.

- SCHREUDER, A. 1940. A revision of fossil water-moles (Desmaninae). — *Arch. néerl. Zool.*, **4**, 201-333, Leiden.
- 1943. Fossil moles and other Mammals (Desmana, Talpa, Equus etc.) out of well-borings in the Netherlands. — *Verh. Geol. Mijnb. Gen. Nederl. Kolon.*, Ser. geol., **13**, 399-434, s'Gravenshage.
- SIMPSON, G. G. 1945. The principles of classification and classification of Mammals. — *Bull. Amer. Mus. Nat. Hist.*, **85**, 1-350, New York.
- STACH, J. 1951. *Arctomeles pliocaenicus*, nowy rodzaj i gatunek z podrodziny bor-sukowatych (*Arctomeles pliocaenicus* n. gen. & sp. from Węże). — *Acta Geol. Pol.*, **2**, 1/2, 129-157, Consp. 55-63, Warszawa.
- 1952. *Ursus wenzensis*, nowy gatunek małego niedźwiedzia pliocińskiego (*Ursus wenzensis*, a new species of a small Pliocene bear). — *Ibidem*, **3**, 1, 103-136, Consp. 21-24.
- 1954. *Nyctereutes* (Canidae) w pliocenie Polski (*Nyctereutes* (Canidae) in the Pliocene of Poland). — *Ibidem*, **4**, 2, 191-206, Consp. 39-41.
- 1957. *Agriotherium intermedium* n. sp. from the Pliocene bone breccia of Węże (*Agriotherium intermedium* n. sp. z pliocińskiej brekcji kostnej, wydobytej w miejscowości Węże w Polsce). — *Acta Palaeont. Pol.*, **2**, 1, 1-17, Warszawa.
- STEHLIN, H. G. 1940. Zur Stammesgeschichte der Soriciden. — *Eclogae Geol. Helv.*, **33**, 298-306, Basel.
- TATARINOV, K. A. 1958. Znachidki zemlerojki blariny na Ukraini. — *Dopov. Akad. Nauk URSR*, **1**, 81-84, Lviv.
- TEILHARD DE CHARDIN, P. 1940. The fossils from locality 18 near Peking. — *Palaeont. Sinica*, **9**, 124, 4-5, Peking.
- TEILHARD DE CHARDIN, P. & PEI, C. W. 1941. The fossil Mammals from locality 13 of Choukoutien. — *Ibidem*, **11**, 126, 5-8.
- TROUESSART, E. L. 1893-99. Catalogus mammalium tam viventium quam fossilium. Quinquennale supplementum. N. ed., **15**, 1/2, 1-929, Berolini.
- VEREŠČAGIN, N. K. & GROMOV, J. M. 1950. Sbor ostatkov vyšších pozvonočných četvertičnogo perioda. — *Izd. Akad. Nauk SSSR*, **20**, 1-37, Moskva.
- VIRET, J. 1938. Etude sur quelques Erinacéidés fossiles, spécialement sur le genre *Palerhinaceus*. — *Trav. Lab. Géol. Univ. Lyon*, Mém. **28**, 34, 1-32, Lyon.
- WEBER, M. 1928. Die Säugetiere. 1/2, 1-898, Jena.
- YOUNG, C. C. 1934. On the Insectivora, Chiroptera, Rodentia and Primates other than *Sinanthropus* from locality 1 at Choukoutien. — *Palaeont. Sinica*, **C**, **8**, 3, 1-160, Peking.
- ŽDANSKY, O. 1928. Die Säugetiere der Quartärfauna von Choukoutien. — *Ibidem*, **C**, **5**, 4, 1-146.

OWADOŻERNE Z PLIOCENSKIEJ BREKCJI KOSTNEJ Z WĘŻÓW

Streszczenie

WSTĘP

Opracowane z Wężów owadożerne są dalszym przyczynkiem do znajomości kręgowców tego znaleziska, opisanych przez J. Stacha (1951, 1952, 1954, 1957), M. Młynarskiego (1953, 1955, 1956) i T. Czyżewską (1958). Owadożerne reprezentowane są dotychczas przez 18 gatunków, należących do rodzin: Erinaceidae Bonap., Talpidae Murray i Soricidae Gray, oraz do 11 rodzajów: *Erinaceus* L., *Talpa* L., *Desmana* Güld., *Galemys*(?) Kaup, *Sorex* L., *Blarinoides* n. gen., *Neomys* Kaup, *Beremendia* Kormos, *Petenya* Kormos, *Crocidura* Wagler i *Suncus* Ehrenb. Poza znanymi już gatunkami z plio-plejstocenu opisano tu 4 nowe: *Erinaceus samsonowiczi* n. sp., *Blarinoides mariae* n. sp., *Neomys soriculoides* n. sp. i *Suncus zelceus* n. sp. Opisy i tabele ich pomiarów znajdują się w tekście angielskim; poniżej podajemy tylko krótkie diagnozy. Są to gatunki plioceńskie, występujące z reguły w dolnych i środkowych partiach brekcji.

Nowy rodzaj *Blarinoides*, bardzo zbliżony do amerykańskiej *Blarina* Gray, jest w Wężach zapewne reliktem mioceneńskim i pochodzi z dolnego pliocenu. Jego stosunek do *Blarina* Gray wyjaśniono na podstawie szczegółowej analizy morfologii czaszek i zuchw. Przypuszczenia o wspólnym ich pochodzeniu są jeszcze hipotetyczne z powodu braku dostatecznej dokumentacji paleontologicznej z terenu Azji. Możliwość migracji tych form mogła przy tym zachodzić tylko we wczesnym pliocenie, lub — co jest prawdopodobniejsze — jeszcze w miocenie. Hipotetyczne są również wnioski co do pokrewieństwa i podobnej możliwości migracji gatunków *Beremendia fissidens* (Pétényi) i *Paracryptotis rex* Hibbard, mimo że znane jest ogniwo pośrednie łączące je, a mianowicie *Beremendia sinensis* (Zdansky).

W pracy niniejszej uzupełniono wnioski poprzednich badaczy o pochodzeniu brekcji i jej wieku; potwierdzono też przypuszczenia Stacha i Młynarskiego co do dwójakiego charakteru fauny. Fauna owadożernej pozwala na ustalenie warunków klimatycznych, panujących w okresie tworzenia się brekcji kostnej z Wężów; część jej bowiem żyła i żyje obecnie w strefie stepowo-pustynnej o klimacie gorącym i suchym, pozostałe zaś reprezentują grupę form wyraźnie palearktycznych, bytujących w strefie klimatu wilgotnego, ciepłego, zbliżonego do dzisiejszego.

Poddano także rewizji mianownictwo zębów jednoguzkowych górnej szczęki u Soricidae, zastosowano uproszczony podział na klasy wieku i podano możliwość połączenia dwu podrodzin Soricinae i Crocidurinae w jedną, wyższą jednostkę systematyczną.

DIAGNOZY NOWYCH JEDNOSTEK SYSTEMATYCZNYCH

Erinaceus samsonowiczi n. sp.

(pl. II, fig. 1 a-c & 2)

Diagnoza. — I_1 szeroki u podstawy, z ostrą krawędzią tnącą. C duży, labialnie przesunięty. P_4 parakonid wysoki, zaokrąglony, pionowy; protokonid ostry, zagięty ku tyłowi; metakonid niski, tępy. Przednia krawędź parakonidu P_4 słabo zaokrąglona. Parakonid M_3 zredukowany do małego sęczka. Labialna strona ramus ascendens (w fossa masseterica) z wyraźnym, lecz niewysokim grzebieniem. Kąt między ramionami żuchwy prawie prosty. Foramen mentale między P_4 a M_1 znacznie niższe, aniżeli u współczesnego jeża. Powierzchnia stawowa processus condyloideus szeroka, prawie prostopadła do ramus ascendens, o rozszerzonej lingwalnie elipsie. Processus angularis szeroki u nasady.

Uwagi. — *Erinaceus samsonowiczi* różni się od wszystkich znanych dotychczas, wymarłych i dzisiejszych gatunków: rozmiarami, dużym kłębkiem labialnie odchylnym, wysokim i pionowym parakonidem P_4 , zredukowanym M_3 z reguły do jednego sęczka, niewysokim grzebieniem w fossa masseterica, elipsoidalną powierzchnią stawową processus condyloideus i znacznie niżej położonym foramen mentale. Pewne podobieństwo budowy żuchwy obserwuje się u miocenkiego gatunku *Erinaceus sansaniensis* Depéret.

Rodzaj *Blarinoides* n. gen.*Blarinoides mariae* n. sp.

(pl. II, fig. 4 a-b; pl. III, fig. 6 a-c; text-fig. 4: 2 a-f)

Diagnoza. — Rodzaj monotypowy, z jednym gatunkiem. Wzór zębowy

$$\frac{3 \ 1 \ 3 \ 3}{1 \ 1 \ 1 \ 3} = 32.$$

I z trzema płatkami, przedni płatek słabszy niż następne. C mały, spłaszczony. P_4 duży, słabo dwuszczytowy, z mocno ku tyłowi wyciągniętym cingulum (pod protokonid M_1). M_1 duży, z rozszerzonym pod protokonidem cingulum, trzykrotnie większy od M_3 . Wszystkie trzonowe pięcioguzkowe. Endokonid M_3 mały, lecz widoczny. Processus coronoides łopatkowaty, z wyraźnym schodkiem; powierzchnia wyrostka gładka, z lekkim zwężeniem. Crista masseterica z wyraźnym kolcem, łukowata; dolny jej koniec skierowany ku górnej powierzchni stawowej processus condyloideus. Górna powierzchnia stawowa wyrostka kondylarnego wąska, w stosunku do dolnej pod kątem 45° lub mniej. Listwa międzystawowa szeroka, słabo lingwalnie wcięta. Dolna powierzchnia stawowa wyrostka kondylarnego szeroka, końcem lingwalnym zagięta ku dołowi, pośrodku wcięta. Kąt między podstawą ramus ascendens a ramus horizontalis rozwarty. Foramen mentale między korzeniami M_1 a widoczną przed nim spłaszczoną area. Processus angularis szeroki u nasady, krótki, przytępiony, z małym zgrubieniem od strony wewnętrznej. Incisura sigmoidea superior głęboka, wcięta

prawie pod kątem prostym. Incisura sigmoidea inferior nie występuje. Fossa pterygoidea mała, kwadratowata, z małym prożkiem.

Rostrum czaszki wydłużone, nie ścięte. Między I^1 a P^4 kości szczęk mocno wgłębione. Foramen lacrimale nad tylnym korzeniem M^1 . Foramen infraorbitale nad P^4 . Foramina palatini anteriora między I^2 — I^3 , z małą, wąską i podłużną szczelinką. Foramina palatini posteriora tuż przed przednimi korzeniami M^1 — I^1 . I^2 mniejszy lub rzadziej równy I^3 ; oba zęby z tyłolingwalnymi piętami. C i P^1 dwukrotnie mniejsze od siecznych, podobne w budowie. P^2 malutki, okrągławy, bez tyłolingwalnej piętki i podsunięty pod P^4 (niewidoczny z boku). P^4 trapezowaty od góry, ze zredukowaną częścią protokonusa. Tylne krawędzie M^1 i M^2 słabo wcięte. M^3 trójguzkowy, ze zredukowanym talonem. Foramen nasale prawie jednakowej szerokości na całej wysokości.

Uwagi. — Rodzaj ten podobny jest do *Blarina* Gray budową siecznego z trzema płatami, ogólnym układem zębów trzonowych, łopatomatym processus coronoideus z labialnym kolcem, ogólnym zarysem powierzchni stawowych processus condyloideus, spłaszczoną areą przed foramen mentale, ilością i budową jednoguzkowych górnej szczęki, położeniem foramen lacrimale i infraorbitale, położeniem otworów podniebiennych i budową trzonowych górnej szczęki. Różni się on jednak znacznie większym P_4 , z mocnym, wyciągniętym ku tyłowi cingulum, małym i spłaszczonym kłem żuchwy, pięcioguzkowym M_3 , silnymi cingulami trzonowców, schodkiem na processus coronoideus, odmienną jednak budową powierzchni stawowych processus condyloideus i szeregiem innych cech, pozwalających na wyodrębnienie w Węzach nowego rodzaju i gatunku.

Neomys soriculoides n. sp.

(pl. III, fig. 4 a-c; text-fig. 5 C, D)

Diagnoza. — I krótki, tępy na końcu, z dwoma płatami i cingulum u podstawy. C mały, ciasno przylegający do I i P_4 , jednoguzkowy. P_4 dwuguzkowy, z wygiętym ku tyłowi cingulum, M_3 dwukrotnie mniejszy od M_1 , czteroguzkowy. Processus coronoideus niski, smukły, z małym schodkiem. Crista masseterica półksiężycowata, bez kolca. Górna powierzchnia stawowa processus condyloideus wąska, ukośna, lingwalnie przedłużona; dolna zaś szeroka, labialnie zwężona, lingwalnie szeroka i wygięta ku dołowi. Listwa międzystawowa prawie dwukrotnie węższa niż dolna powierzchnia stawowa, labialnie prosta, lingwalnie głęboko wcięta. Incisura sigmoidea superior i inferior głębokie. Processus angularis smukły, krótki, ostry. Fossa pterygoidea mała, owalna, z poprzecznym prożkiem. Foramen mentale pod przednim korzeniem M_1 . Kąt między ramionami żuchwy rozwarty. Górna partia processus coronoideus lekko pochylona ku przodowi.

Rostrum czaszki ścięte. Foramen lacrimale między korzeniami M^1 i M^2 . Foramen infraorbitale duże, owalne, nad M^1 . Przedni płat I^1 prawie dwukrotnie wyższy od talonu. I^2 i I^3 nieco mniejsze od talonu I^1 , prawie równej wielkości. P^1 mały, pod-

sunięty pod P^4 , widoczny z boku. Zęby jednoguzkowe z tylnymi piętami. Trzonowe wyraźnie z tyłu wcięte. M^3 mały, dwuguzkowy.

Uwagi. — Gatunek ten różni się od pozostałych plio-plejstocenijskich form tego rodzaju: obecnością dwóch płatów na I, wygiętym ku tyłowi cingulum P_4 , czteroguzkowym M_3 , smuklejszym processus coronoideus z małym schodkiem, szerszą listwą międzystawową, małą fossa pterygoidea, mocniej podsuniętym P^1 pod P^4 . Od rodzaju *Soriculus* Blyth różni się budową siecznego żuchwy, czteroguzkowym M_3 , dużym foramen infraorbitale i położeniem P^1 . Podobieństwo występuje tylko w rozmiarach i ogólnym kształcie budowy całej żuchwy.

Suncus zelceus n. sp.

(pl. III, fig. 2 a-b; pl. IV, fig. 1 a-c)

Diagnoza. — Żuchwa drobna, delikatna. I krótki, ze słabymi dwoma płatami. C mały, jednoguzkowy. P_4 wysoki, jednoguzkowy. Oba zęby jednakowej długości, ściśnięte, bez luk. M_3 z małym, silnie zredukowanym talonidem, z reguły trójguzkowy. Cingulum trzonowców lekko wydęte pod protokonidami. Processus coronoideus u podstawy szeroki, szybko zwężający się ku górze, z małym schodkiem. Processus condyloideus niski; górna powierzchnia stawowa krótka, słabo ukośna, dolna silnie lingwalnie wydłużona; obie powierzchnie równoległe. Listwa międzystawowa wąska, równa długości górnej powierzchni stawowej processus condyloideus. Processus angularis krótki, szpilkowaty. Fossa pterygoidea trójkątna, głęboka, ze słabym poprzecznym prożkiem. Foramen mentale między korzeniami P_4 a M_1 . Kąt między ramionami żuchwy lekko rozwarty. Incisura sigmoidea superior i inferior głęboko wcięte.

Uwagi. — *Suncus zelceus* n. sp. różni się od gatunków *S. etruscus* (Savi) i *S. pannonicus* (Kormos): mniejszymi rozmiarami, krótkim siecznym z dwoma płatami, ściśniętymi, bez luk C i P_4 , silnie zredukowanym talonidem M_3 (do trzech guzków), wydęciami cingulum pod protokonidami trzonowców, słabym schodkiem na processus coronoideus, silniej lingwalnie wysuniętą dolną powierzchnią stawową processus condyloideus i jej ułożeniem w stosunku do górnej.

OBJAŚNIENIA DO ILUSTRACJI

Fig. 1 (p. 121)

Podłużny przekrój leja krasowego z brekcją kostną (według J. Samsonowicza, 1934): 1 gleba barwy szarej, 2 rumosz wietrzelinowy, 3 czerwona brekcja z rudą bobową, 4 & 5 „szara“ brekcja, między warstwami brekcji „szarej“ — soczewki brekcji czerwonej, 6 wapień skorupowy barwy różowo-kremowej, 7 glina ceglasta z brekcją kostną i rudą bobową, 8 kalcyt, 9 nacieki wapienia skorupowego i kalcytu, 10 wapień turajski.

Fig. 2 (p. 127)

Schematyczne rysunki przedstawiające stosowane pomiary: *A* długość żuchwy, *a* całkowita, *b* zasadnicza; *B* wysokość wyrostków stawowych, *a* processus coronoideus, *b* proc. condyloideus, *c* długość proc. angularis.

Fig. 3 (p. 128)

a Budowa processus condyloideus (articularis): *fc. c. sup.* facies condyli superior, *fc. c. inf.* facies condyli inferior, *l. intart.* lamina interarticulares.

b Budowa wyrostków stawowych i tylnej partii żuchwy: *inc. s. sup.* incisura sigmoidea superior, *inc. s. inf.* incisura sigmoidea inferior, *f. ptg.* fossa pterygoidea, *for. mnd.* foramen mandibulae, *lim.* limula.

Fig. 4 (p. 146)

1 *Beremendia fissidens* (Petényi): *a* okaz No. 710, fragment rostralny czaszki, z boku, *b* z dołu, *c* zarys otworu nosowego; *d* lewa żuchwa, od wewnątrz (okaz No. 80); *e* dolny szereg zębów bez I, *f* processus condyloideus z tyłu.

2 *Blarinoides mariae* n. sp.: *a* okaz No. 800, fragment rostralny czaszki, z boku, *b* z dołu, *c* prawa połowa górnej szczęki z szeregiem zębów I¹—M² i zaznaczoną szóstą alweolą (P³), *d* zarys otworu nosowego, *e* dolny szereg zębów bez I, *end* endokonid, *f* processus condyloideus z tyłu.

Uwaga: Wyrostki kondylarne i dolne szeregi zębów dwukrotnie powiększone w stosunku do pozostałych ilustracji.

Fig. 5 (p. 149)

A & B Petenyia hungarica Kormos (okaz No. 1009): *A* fragment rostralny czaszki, z dołu, *B* z boku, *C & D Neomys soriculoides* n. sp., holotyp (okaz No. 1109): *C* rostralny fragment czaszki, z dołu, *D* z boku.

Pl. I

Nadtrawiony kwasem octowym blok brekcji kostnej; połowa wielkości naturalnej.

Pl. II

Fig. 1. *Erinaceus samsonowiczi* n. sp., paratyp (okaz No. 1052), prawa żuchwa: *a* od wewnątrz, *b* od zewnątrz, *c* powierzchnia stawowa processus condyloideus.

Fig. 2. *Erinaceus samsonowiczi* n. sp., holotyp (okaz No. 1051), lewa żuchwa od zewnątrz.

Fig. 3. *Desmana nehringi* Kormos, czaszka (okaz No. 1201), *a* z boku, *b* od góry; żuchwa lewa (okaz No. 1204), *c* od zewnątrz, *d* otwór nosowy.

Fig. 4. *Blarinoides mariae* n. gen., n. sp., genoholotyp (okaz No. 803), czaszka, *a* z dołu, *b* górny szereg zębów z I¹—P⁴ (schemat).

Fig. 5. *Blarina brevicauda* (Say), czaszka z dołu, współczesna.

Pl. III

Fig. 1. *Suncus pannonicus* (Kormos), prawa żuchwa (okaz No.183), *a* od zewnątrz, *b* processus condyloideus.

Fig. 2. *Suncus zelceus* n. sp., paratyp (okaz No.402), prawa żuchwa, *a* od zewnątrz, *b* processus condyloideus.

Fig. 3. *Petenya hungarica* Kormos, lewa żuchwa (okaz No.48), *a* od wewnątrz, prawa żuchwa (okaz No.9), *b* od zewnątrz; *c* processus condyloideus.

Fig. 4. *Neomys soriculoides* n. sp., holotyp, prawa żuchwa (okaz No. 700), *a* od wewnątrz; holotyp, lewa żuchwa (okaz No.160), *b* od zewnątrz, *c* processus condyloideus.

Fig. 5. *Blarina brevicauda* (Say), prawa żuchwa od zewnątrz, współczesna.

Fig. 6. *Blarinoides mariae* n.sp., paratyp (okaz No. 342), *a* prawa żuchwa od zewnątrz; holotyp (okaz No.178), *b* lewa żuchwa od zewnątrz, *c* od wewnątrz.

Fig. 7. *Beremendia fissidens* (Petényi), lewa żuchwa (okaz No.80), od zewnątrz.

Pl. I-III. Fotografie retuszowane

Pl. IV

Fig. 1. *Suncus zelceus* n. sp., holotyp (okaz No.502), prawa żuchwa, *a* od wewnątrz, *b* od zewnątrz, *c* processus condyloideus.

Fig. 2. *Suncus pannonicus* (Kormos), prawa żuchwa (okaz No.183), *a* od zewnątrz, *b* processus condyloideus.

Fig. 3. *Sorex* cf. *minutus* Linnaeus, lewa żuchwa (okaz No.207), *a* od zewnątrz, *b* processus condyloideus.

Fig. 4. *Crocidura* sp., przednia część lewej żuchwy (okaz No.334), *a* od zewnątrz, *b* od wewnątrz; tylna część lewej żuchwy (okaz No.341), *c* od zewnątrz, *d* od wewnątrz, *e* processus condyloideus.

Fig. 5. *Sorex runtonensis* Hinton, prawa żuchwa (okaz No.1), *a* od zewnątrz, *b* od wewnątrz, *c* processus condyloideus.

Fig. 6. *Sorex* sp. (*S. savini* Hinton?), lewa żuchwa (okaz No.1100), *a* od wewnątrz, *b* od zewnątrz, *c* processus condyloideus.

Fig. 7. *Sorex* sp. (*S. dehneli* Kowalski?), prawa żuchwa (okaz No.1101), *a* od wewnątrz, *b* od zewnątrz, *c* dolny szereg zębów żuchwy, z góry, bez I.

Fig. 8. *Sorex araneus* Linnaeus, prawa żuchwa (okaz No.500), *a* od wewnątrz, *b* od zewnątrz.

Fig. 9. *Talpa fossilis* Petényi, *a* fragment lewej żuchwy (okaz No.951), od zewnątrz; *b* przednia część lewej żuchwy (okaz No.954) z I 1-3 i C, od zewnątrz.

Fig. 10. *Talpa minor* Freudenberg (okaz No.518), prawy fragment żuchwy, od zewnątrz.

Fig. 11. *Erinaceus* sp. (okaz No. 1060), lewy fragment żuchwy bez zębów, od zewnątrz.

Uwaga: Powiększenie wyrostków kondylarnych u Soricidae dwukrotnie większe, aniżeli ilustracje żuchw.

АНДРЖЕЙ СУЛИМСКИ

НАСЕКОМОЯДНЫЕ ИЗ ПЛИОЦЕНОВОЙ КОСТНОЙ БРЕКЧИИ
В МЕСТНОСТИ ВЕНЖЕ

Резюме

ВВЕДЕНИЕ

Описанные в работе насекомоядные найдены в карстовой воронке, заполненной двумя видами брекчии: „красной” — с обильной примесью остаточных глин и бобовой руды (*terra rossa*) и „серой” — сильно кальцитизированной.

В брекчии находится большое количество костей мелких и крупных позвоночных, главным образом млекопитающих. Остатки пресмыкающихся, амфибий и птиц — немногочисленные.

Кости разбросаны и сильно потресканы, темнобурого и черного цвета. Полюсти черепов и трубчатых костей заполнены кальцитом.

Материал отпрепарирован раствором уксусной кислоты. В зависимости от сохранности костей применялась концентрация в 5, 10 или 15%. Во избежание вредного действия кислоты, частично отпрепарированные кости смазывано жидким парафином. Выделенные кости пропитывано раствором шеллака.

Характер цемента и чередование слоев указывают на то, что костная брекчия возникла во время нескольких продолжительных климатических циклов. „Красная” брекчия соответствует повидимому периодам жаркого и сухого климата (зоны пустынь и степей), а „серая” — условиям более холодного и влажного климата, свойственного современным зонам южной палеарктики.

Накопленные костные остатки можно подразделить на четыре группы: одни из них — это кости животных постоянно или временно населявших бывшую пещеру, вторые — принадлежат немногочисленным млекопитающим и пресмыкающимся, случайно попавшим в эродированную уже пещеру, другие являются остатками притащенными хищными млекопитающими и птицами, а остальные принадлежат разным животным, которые погибли в близости и принесены в пещеру и ущелья в периоды ливней.

Возраст брекчии из местности Венже определен на основании изученных до сих пор хищных и насекомоядных. Верхние слои брекчии (известняковый щебень) причислено к верхнему плиоцену и нижнему плейстоцену, а может быть и к первому межледниковому периоду, нижние — отнесены к верхнему миоцену и нижнему плиоцену.

В составе фауны насекомоядных, кроме новых видов (см. описание и таблицы измерений в английском тексте), находятся: *Erinaceus* sp. (близкий *E. lecheri* Kormos), *Galemys* (?) sp. (возможно что это *Mygalina hungarica* (Kormos)), *Desmana nehringi* Kormos, *Talpa minor* Freudenberg, *Talpa fossilis* Petényi, *Talpa* sp. (по всей вероятности *T. europea* L. (*fossilis*)), *Sorex runtonensis* Hinton, *Sorex araneus*

Linnaeus, *Sorex* cf. *minutus* Linnaeus (не исключено *S. minutissima* Heim de Balsac), *Sorex* sp. (остатки принадлежащие по всей вероятности к двум видам: *S. savini* Hinton и *S. dehnelti* Kowalski), *Beremendia fissidens* Petényi (многочисленный), *Petényia hungarica* Kormos, *Crocidura* sp. (повидимому новый вид, немногочисленный) и *Suncus pannonicus* (Kormos).

В фауне хищных и насекомоядных можно выделить две группы. Первая состоит из форм южной фауны зоны пустынь и степей, вторая — из палеарктических видов обитающих во влажных и теплых районах разного ландшафта, похожего на современный.

Новый род *Blarinoides*, морфологически, а повидимому и генетически, близок американскому *Blarina* Gray, является по всей вероятности миоценовым реликтом и очевидно вымер еще в первой половине плиоцена вследствие похолодания климата.

В работе обсуждено взаимное соотношение между видами *Beremendia fissidens* (Petényi), „*Blarina ucrainica*” Pidopličko и *Paracryptotis rex* Hibbard, вместе с их местом в систематике, географическим и стратиграфическим распространением и происхождением.

Общая часть работы содержит замечания о некоторых измерениях, исполнении иллюстрации, введении новых морфологических терминов, применении упрощенного разделения образцов на классы разного возраста, степени окраски зубов, ее таксономическом значении и о номенклатуре однобугорчатых зубов верхней челюсти у *Soricidae*.

В описании даны подробные сведения о новых видах и дополнение данных касающихся изменчивости и морфологических различий известных уже видов.

ДИАГНОЗЫ НОВЫХ ВИДОВ

Erinaceus samsonowiczi n. sp.

(пл. II, фиг. 1 а-с & 2)

Диагноз.— I_1 широкий у основания, с острым режущим краем. С — большой, несколько передвинут в лабиальном направлении. P_1 с высоким, острым, вертикальным параконидом; протоконид острый, изогнутый назад; метаконид низкий, тупой. Передний край параконида P_4 слабо заостренный. Параконид на M_3 редуцированный, в виде небольшого сучка. Лабиальная сторона восходящей ветви (в fossa masseterica) с отчетливым и невысоким гребнем. Угол между ветвями челюсти почти прямой. Foramen mentale между P_4 и M_1 , значительно более низкий чем у современного ежа. Суставная поверхность на processus condyloideus широкая, почти перпендикулярная к восходящей ветви, с расширенным лингвальным эллипсом. Processus angularis широкий у основания.

Род *Blarinoides* n. gen.Геноголотип *Blarinoides mariae* n. sp.

(пл. II, фиг. 4 a-b; пл. III, фиг. 6 a-c; текст-фиг. 4: 2 a-f)

Диагноз.— Зубная формула $\frac{3 \ 1 \ 3 \ 3}{1 \ 1 \ 1 \ 3} = 32$. I — с тремя лопастями. Передняя

лопасть сильнее задних. С — маленький, плоский. Р₄ большой, слабо двухбугорчатый, с сильно вытянутым назад (под протоконид М₁) cingulum. М₁ большой с расширенным и вздутым вниз под протоконид cingulum. М₃ три раза меньший чем М₁, пятибугорчатый (энтоконид видимый). Processus coronoideus лопатовидный, с отчетливой ступенькой. Суставная поверхность processus coronoideus гладкая, без сужения. Crista masseterica с отчетливым шипом, дугообразная, нижним концом обращенная к верхней суставной поверхности на processus condyloideus. Верхняя суставная поверхность узкая, расположена под углом 45° по отношению к нижней челюсти. Межсуставная пластинка широкая, со слабой лингвальной вырезкой. Нижняя суставная поверхность на processus condyloideus широкая, с согнутым вниз лингвальным концом с вырезкой посередине. Угол между основаниями восходящей и горизонтальной ветви тупой. Foramen mentale между корнями М₁ и плоской площадкой спереди его.

Ростр черепа удлинённый, нескосённый. Между М¹ и Р⁴ кости челюстей сильно углубленные. Foramen lacrimale над задним корнем М¹. Foramen infraorbitale над Р⁴. Foramina palatini anteriora между I²—2; между ними находится небольшая, продолговатая щель. Foramina palatini posteriora тут же перед передними корнями М¹—1. I² меньший, реже равный I³; оба — с заднелингвальными пятками. С и Р¹ вдвое меньше чем резцы, похожи по строению. Р² маленький, округленный, лишен заднелингвальной пятки, всунутый под Р⁴, не видимый сбоку. Р⁴ сверху трапециевидный. Задние края М¹ и М² со слабой вырезкой. М³ трехбугорчатый, с редуцированным талоном. Носовое отверстие почти одинаковой ширины на всех уровнях.

Род до сих пор монотиповый.

Neomys soriculoides n.sp.

(пл. III, фиг. 4 a-c; текст-фиг. 5 C, D)

Диагноз.— I — короткий, с тупым концом, с двумя лопастями и cingulum у основания. С — небольшой, тесно прилегающий к I и Р₄, однобугорчатый. Р₄ двухбугорчатый, с изогнутым назад cingulum. М₃ вдвое меньший чем М₁, четырехбугорчатый. Processus coronoideus низкий, тонкий, с небольшой ступенькой. Crista masseterica имеет форму полумесяца, лишена шипа. Верхняя суставная поверхность на processus condyloideus узкая, диагональная, удлиненная лингвально; нижняя — широкая уже лабиально, более широкая лингвально изогнута вниз. Межсуставная пластинка почти вдвое уже нижней суставной по-

верхности, прямая лабиально, лингвально с глубокой вырезкой. *Incisura sigmoidea superior* и *inferior* глубоко врезаны. *Processus angularis* тонкий, короткий, острый. *Fossa pterygoidea* небольшая, овальная, с небольшим поперечным порогом. *Foramen mentale* под передним корнем M_1 . Угол между ветвями нижней челюсти тупой. Верхняя часть *processus coronoideus* наклонена немного вперед.

• Ростр черепа скошенный. *Foramen lacrimale* между корнями M^1 и M^2 . *Foramen infraorbitale* большое, овальное, над M^1 . Передняя лопасть I^1 почти вдвое высшая чем талон, I^2 и I^3 меньшие чем талон I^1 . I^3 более низкий чем I^2 . P^1 небольшой, подвинут под P^4 , видимый сбоку. Однобугорчатые с пятками сзади *singulum*. Протоконус P^4 направлен несколько назад. Коренные зубы с отчетливой вырезкой сзади. M^3 небольшой, двухбугорчатый.

Suncus zelceus n. sp.

(пл. III, фиг. 2 a-b; пл. IV, фиг. 1 a-c)

Диагноз.— Нижние челюсти мелкие, тонкие. I — короткий, с двумя слабыми лопастями. C — небольшой, однобугорчатый. P_4 высокий, однобугорчатый. Оба зуба одинаковой длины, тесно прижаты друг к другу. M_3 с небольшим, сильно редуцированным талонидом, трехбугорчатый. *Singulum* коренных зубов с небольшим вздутием под протоконидами. *Processus coronoideus* широкий у основания, скоро суживающийся кверху, со слабой ступенькой. *Processus condyloideus* низкий. Верхняя суставная поверхность короткая, несколько диагональная; нижняя сильно удлиненная лингвально; обе поверхности параллельны друг к другу. Межсуставная пластинка узкая, с длиной равной верхней суставной поверхности *processus condyloideus*. *Processus angularis* короткий, игловидный. *Fossa pterygoidea* треугольная, глубокая, со слабым поперечным порогом. *Foramen mentale* между корнями P_4 и M_1 . Угол между ветвями нижней челюсти несколько тупой. *Incisura sigmoidea superior* и *inferior* очень отчетливы, глубокие.

EXPLANATIONS OF PLATES

Pl. I

A block of bone breccia etched with acetic acid; one half the natural size.

Pl. II

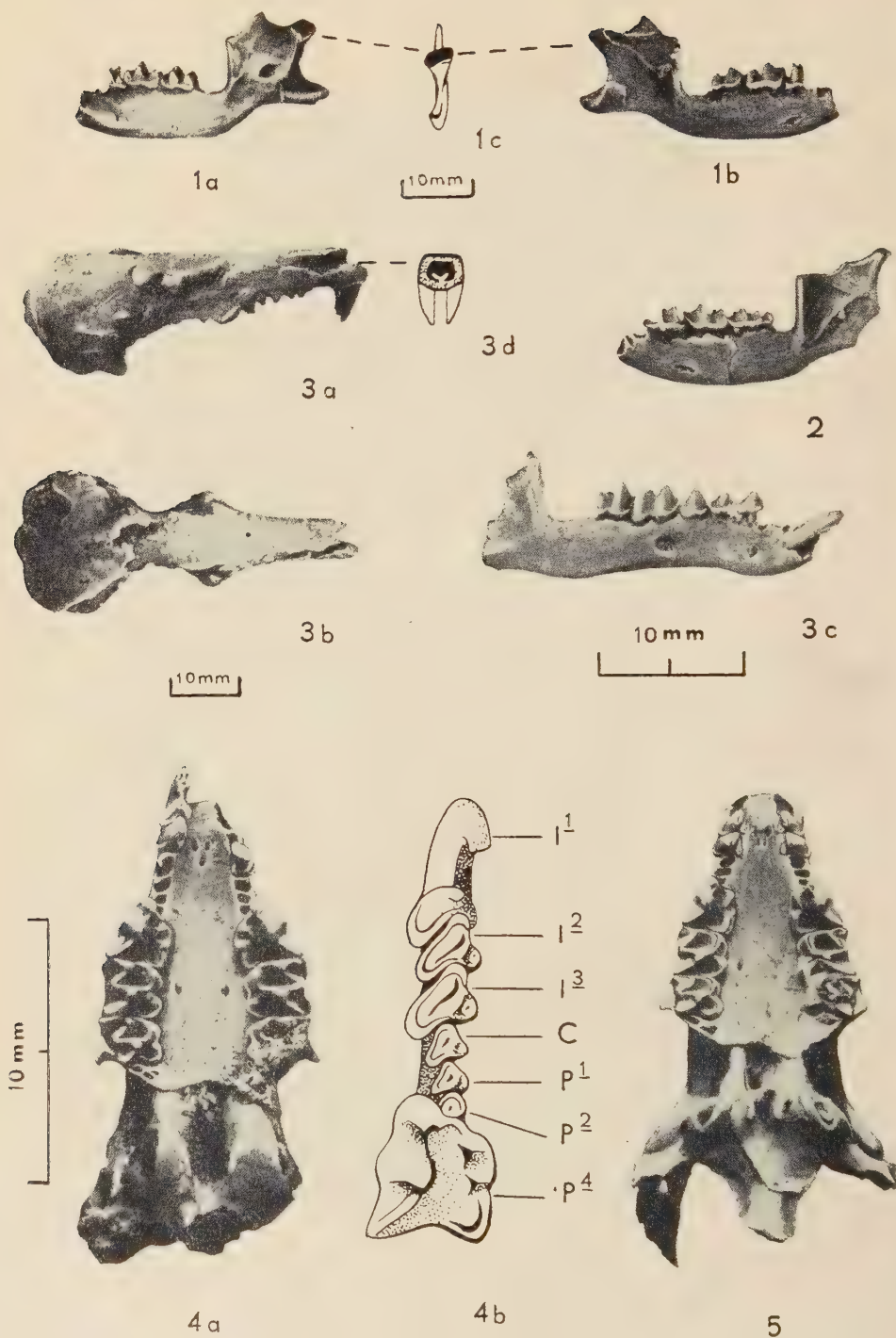
- Fig. 1. *Erinaceus samsonowiczi* n. sp., paratype (spec. No. 1052), right mandible: *a* inner view, *b* outer view, *c* articular facet of condyloid process.
- Fig. 2. *Erinaceus samsonowiczi* n. sp., holotype (spec. No. 1051), outer view of left mandible.
- Fig. 3. *Desmana nehringi* Kormos, skull (spec. No. 1201), *a* side view, *b* top view; right mandible (spec. No. 1204), *c* outer view, *d* nasal foramen.
- Fig. 4. *Blarinoides mariae* n. gen., n. sp., genoholotype (spec. No. 803): *a* ventral view of skull, *b* upper tooth-row with I¹—P⁴ (scheme).
- Fig. 5. *Blarina brevicauda* (Say), bottom view of skull, recent.

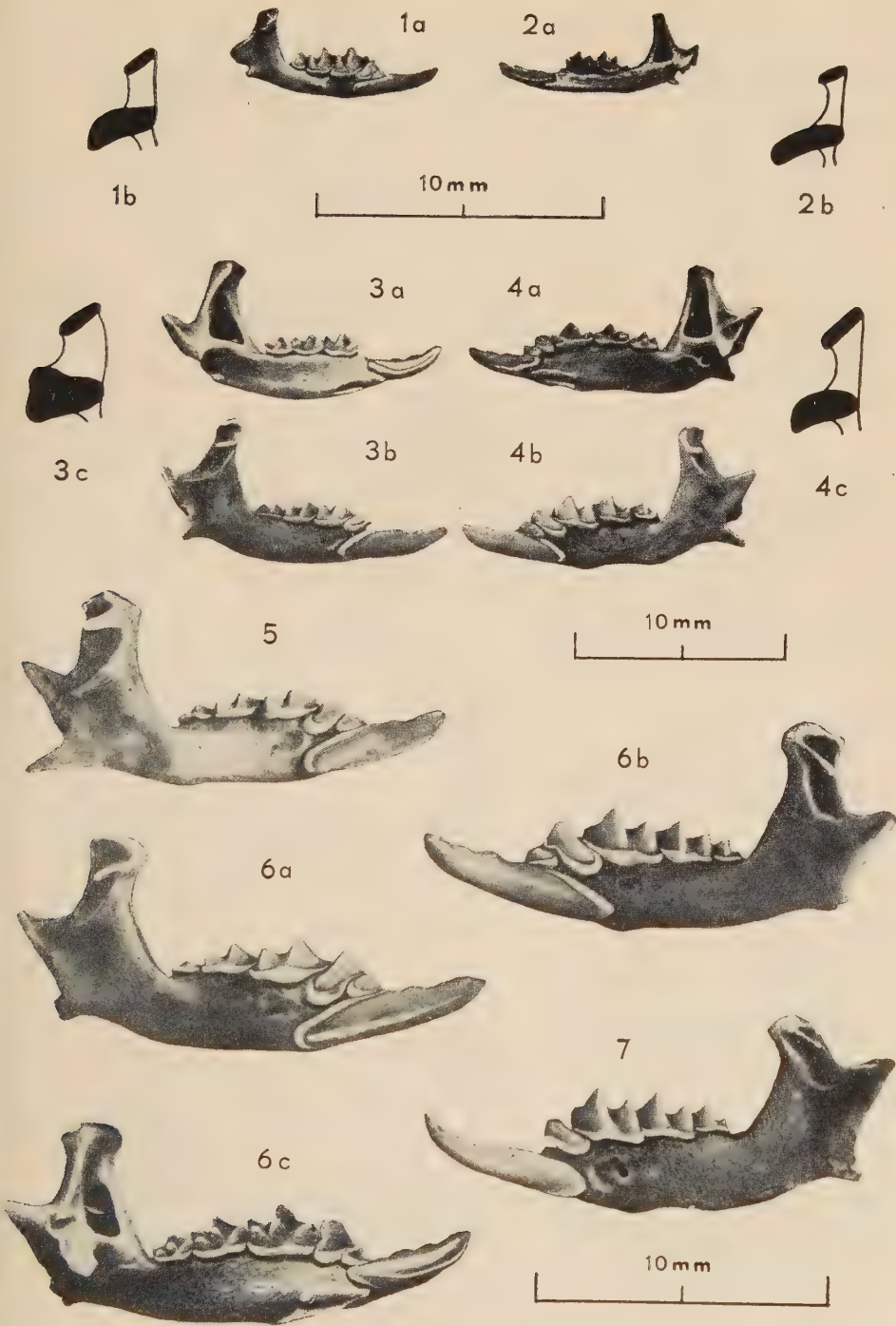
Pl. III

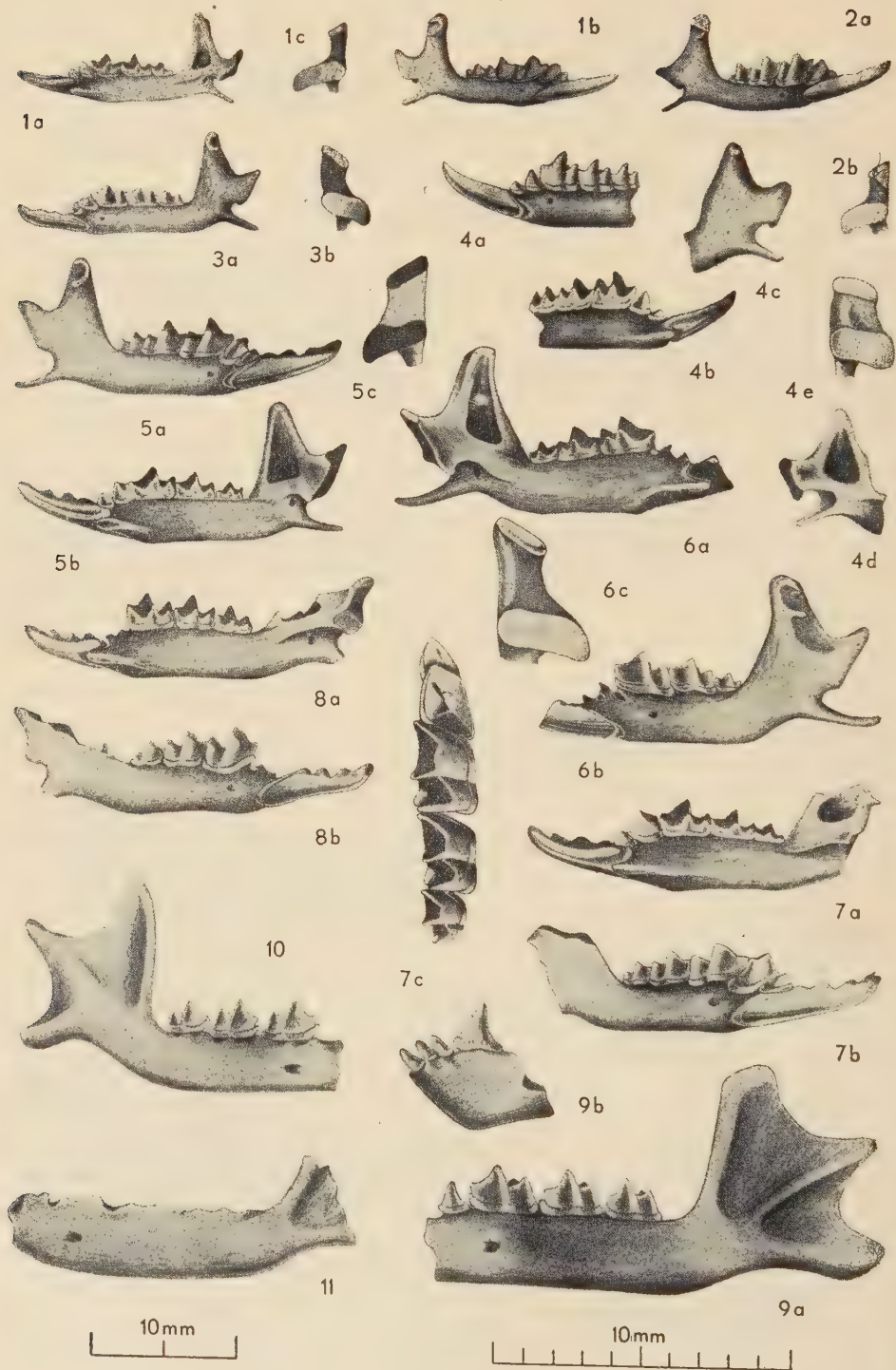
- Fig. 1. *Suncus pannonicus* (Kormos), right mandible (spec. No. 183), *a* outer view, *b* condyloid process.
- Fig. 2. *Suncus zelceus* n. sp., paratype (spec. No. 402), right mandible, *a* inner view, *b* condyloid process.
- Fig. 3. *Petenyia hungarica* Kormos, left mandible (spec. No. 48), *a* inner view; right mandible (spec. No. 9), *b* outer view, *c* condyloid process.
- Fig. 4. *Neomys soriculoides* n. sp., holotype, right mandible (spec. No. 700), *a* inner view; holotype, left mandible (spec. No. 160), *b* outer view, *c* condyloid process.
- Fig. 5. *Blarina brevicauda* (Say), outer view of right mandible, recent.
- Fig. 6. *Blarinoides mariae* n. sp., paratype (spec. No. 342), *a* outer view of right mandible; holotype (spec. No. 178), *b*, *c* outer and inner views of left mandible.
- Fig. 7. *Beremendia fissidens* (Petényi), left mandible (spec. No. 80), outer view.

Pl. I-III. Photographs are retouched.









Pl. IV

- Fig. 1. *Suncus zelceus* n.sp., holotype (spec. No. 502), right mandible, *a* inner view, *b* outer view, *c* condyloid process.
- Fig. 2. *Suncus pannonicus* (Kormos), right mandible (spec. No. 183), *a* outer view, *b* condyloid process.
- Fig. 3. *Sorex* cf. *minutus* Linnaeus, left mandible (spec. No. 207), *a* outer view, *b* condyloid process.
- Fig. 4. *Crocidura* sp., anterior part of left mandible (spec. No. 334), *a* outer view, *b* inner view; posterior part of left mandible (spec. No. 341), *c* outer view, *d* inner view, *e* condyloid process.
- Fig. 5. *Sorex runtonensis* Hinton, right mandible (spec. No. 1), *a* outer view, *b* inner view, *c* condyloid process.
- Fig. 6. *Sorex* sp. (*S. savini* Hinton?), left mandible (spec. No. 1100), *a* inner view, *b* outer view, *c* condyloid process.
- Fig. 7. *Sorex* sp. (*S. dehnelli* Kowalski?), right mandible (spec. No. 1011), *a* inner view, *b* outer view, *c* top view of lower tooth-row of mandible without I.
- Fig. 8. *Sorex araneus* Linnaeus, right mandible (spec. No. 500), *a* inner view, *b* outer view.
- Fig. 9. *Talpa fossilis* Petényi, *a* fragment of left mandible (spec. No. 951), outer view; *b* anterior part of left mandible (spec. No. 954) with I₁₋₃ and C, outer view.
- Fig. 10. *Talpa minor* Freudentberg (spec. No. 518), outer view of right mandible fragment.
- Fig. 11. *Erinaceus* sp. (spec. No. 1060), outer view of left mandible fragment without teeth.

Remark: Condyloid processes in Soricidae enlarged twice as much as the mandibles illustrations.

MARIAN MLYNARSKI

GLARICHELYS KNORRI (GRAY) — A CHELONIID
FROM CARPATHIAN MENILITIC SHALES (POLAND)

Abstract. — The fossil remains here described belonged to a young individual of *Glarichelys knorri* (Gray), a sea turtle. They were collected from Carpathian menilitic shales at Winnica near Jasło. Its systematic position is discussed and general comments are made on some fossil and recent sea turtles, on problems concerning their morphology, on the taxonomic significance of phalanges in fossil sea turtles, and on the presence in cheloniids of *foramina praenuchalia*. Biological and ecological notes concerning *G. knorri* (Gray) are likewise given.

INTRODUCTION

The fossil sea turtle remains here described have been collected from an outcrop in the steep bank of the Jasiołka stream, near the Winnica farm, about 10 km to the east of Jasło (Polish Carpathians). The specimen was found in greyish-brown menilitic shales intercalating the Krosno sandstone beds, about 30 m above the foot of the mentioned bank.

Unfortunately, the geological age of these beds has not, as yet, been definitely established. On their microfauna it is probably Lower Oligocene or Upper Eocene¹.

The vertebrate fauna from the Jasło area has lately attracted the attention of palaeontologists. Abundant and well preserved bony fish remains have been collected there. They belong to several families, mostly to Clupeidae and Gadidae. They are now being worked out by A. Jerzmańska (1958) of the Wrocław University.

About 10 years ago, Dr. S. Kadyi, a Jasło physician, collected two specimens of a sea turtle. One of these is described in the present paper; the other has, unfortunately, been lost. In Dr. Kadyi's opinion the lost specimen was of about the same size as the one here described, its skull was in a better state of preservation. Imprints of a land plant of indeter-

¹ For these data the writer is indebted to Dr. J. Małecki of the Cracow Academy of Mining and Metallurgy.

minate systematic position had been also preserved with it. The here studied specimen is part of a palaeontological collection in the possession of Dr. Kadyi.

Cheloniid sea turtles have frequently been recorded from the Tertiary of Europe, but never thus far from Poland.

During the identification of the Winnica turtle remains, the writer had at his disposal copious comparative material from the collections of the Institute of Zoology of the Polish Academy of Sciences and of the Wrocław University, as well as those belonging to scientific institutes in São Paulo and Rio de Janeiro. Some of the materials available had been received by the writer as a gift from the Brazilian institutions; others had been personally collected during an expedition from Brasil to the Island of Ilha da Trindade in the South Atlantic Ocean. The writer desires to express his warmest thanks for the assistance and friendly attitude shown to him by the following persons: Dr. S. Kadyi who kindly lent to the writer the Winnica specimen; Prof. Dr. Paulo Sawaya of the Departamento de Fisiologia Geral e Animal da Universidade de São Paulo; Dr. Illevellyn I. Price of Divisão de Geologia e Mineralogia of the Brazilian Geological Service; Prof. Dr. Vladimir Bessnard of Instituto Oceanografico da Universidade de São Paulo, Sr. João Cavalheiro and Dr. Alphons R. Hoge, both of Instituto Butantan of São Paulo, finally to Dr. Paulo Moreira da Silva, a frigate commander in the Brazilian Navy.

Most cordial thanks are also due to Dr. Rainer Zangerl of the Chicago Natural History Museum for his most valuable comments on the variability of the shell structure in sea turtles.

MATERIAL

The here studied sea turtle remains consist of a nearly complete carapace, well preserved fragments of plastron, inner surface impression of skull roof, shoulder girdle bones (*scapula*, *coracoid*), a small fragment of pelvic girdle (*os pubis*), also detached digit phalanges and limb bones. Moreover minute impressions of fragmentary skeleton bones which, owing to their small dimensions and inadequate state of preservation, cannot be accurately described or identified (see photograph of specimen — pl. I).

Our turtle remains are excellently preserved and bituminized, but compressed between two laminae of menilitic shales. Thanks to this, two impressions of the same specimen have been preserved: the "negative" and the "positive". The attached photograph shows the "positive" impression only. However, during the analysis and description of the various skeletal elements the "negative" impression proved very serviceable, the

several neural plates being there far more clearly outlined. All these remains are exceedingly fragile and unsuitable for further preparation. Excellent impressions of many plastral bones as well as traces of many horny carapacial scutes permit an adequate reconstruction.

Dimensions of the studied specimen are (in mm):

Length of carapace including nuchal plate	80.0
Width of carapace on 3rd costal plate	50.0
Length of skull	24.0
Maximum width of skull	8.0

On the rather small dimensions of the studied remains and the degree of ossification of plastral fragments it may be inferred that they belong almost to a hatchling.

DESCRIPTION

Carapace

This is the best preserved part of the material. Thanks to the presence of nearly all the bony plates and impressions of many horny scutes, it has been possible to make a satisfactory reconstruction (fig. 1) by restoring the few missing elements. The surface of the vertebral and, in part, that of the pygal area has been rather strongly damaged.

The carapace is of oval outline, without marginal notches or depressions. It resembles young carapaces of the recent genus *Chelonia*, as well as those of the "ovata" type in species *Glarichelys knorri* (Gray) (R. Zangerl, 1958, p. 20, fig. 10).

Nuchale. A well preserved plate showing its inner surface, of subtrapezoid shape, so characteristic of cheloniids (close resemblance to young specimens of *Chelonia mydas* L.). Right antero-lateral margin damaged. Anterior margin slightly notched, massive. Margin (*sulcus*) connecting the nuchal with the first

neural wall preserved. Notches forming part of margins of *foramina praenuchalia* not so distinct.

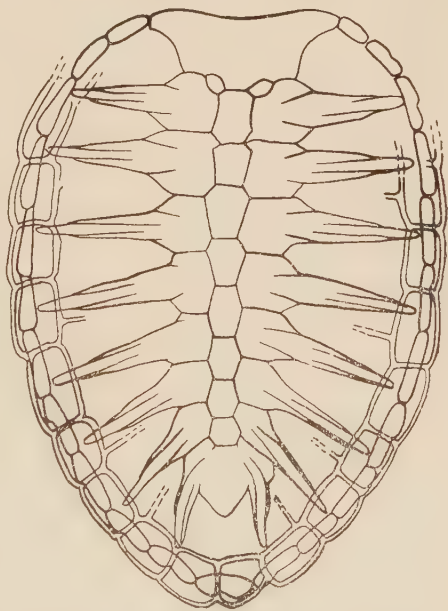


Fig. 1 — *Glarichelys knorri* (Gray), reconstruction of carapace in the young specimen from Winnica; nat. size.

Neuralia. Neurals very faintly outlined, except the first neural; this is well preserved but not very characteristic. Appearance of remaining plates detectable on the "negative". Neural morphology is as follows: 1st neural quadrangular, with slightly domed margins; the adjacent 2nd neural regularly hexagonal, resembling neural plates typical of *Chelonia* and *Eretmochelys*; 3rd and 4th neurals elongated with anterior and antero-lateral margins about equal in length; plates typical of recent cheloniids are similarly shaped; 5th neural broader than the others, with distinctly shorter antero-lateral margins; 6th and 7th neurals, on the contrary, more elongated and resembling these plates in genus *Geoemyda* Gray (Emydidae) in that their antero-lateral margins are longer than the postero-lateral; 8th neural smaller than the rest, quadrangular, with slightly domed lateral margins somewhat converging anteriorly.

It should be noted that all the neurals exhibit a characteristic symmetry and regularity of structure, together with lack of structural deviations so common within the *Caretta-Lepidochelys* group. Traces of junctures of the particular plates with the vertebral ossicles occur on the surface of plates, whereas e. g. in genus *Procolpochelys* (Zangerl, 1955) they are on the juncture of these plates. In the "negative" impression the vertebral margin of the carapace is readily discernible. It resembles analogous margins observable in recent young sea turtles, but disappearing with individual growth.

Suprapygale is a small plate, apparently wedged in between costals c 8, shaped like a rhombus with blunted angles. Suprapygale margins hardly detectable, as this part of carapace is overlapped by the xiphiplastral. The relatively well preserved pygal portion of the carapace suggests its poor development, similarly as in representatives of *Glarichelys knorri* (Gray), in many Taxocheliidae, and in recent young individuals of *Eretmochelys*.

Costalia, all excellently preserved. Outer bony structure readily discernible. The extent of costal ossification indicates that our specimen is not a true hatchling. The free rib ends of costals long and pointed. A distinct epithecal thickening, observable in the vertebral area of the carapace, interconnecting the several costal plates. Costal c 1 with fairly distinct traces of notches, constituting a part of *foramina praenuchalia*, most distinct in left plate c 1. Free ends of c 8 running nearly straight caudally approximately parallel to median carapacial margin, similarly as in young specimens of genus *Chelonia*.

Marginalia. Plates m 3 through m 11 satisfactorily preserved. Though rather narrow, they display fairly strong ossification and have a notably robust structure. They form the serrated outer margin of the carapace.

Pygale similar to marginals. Fairly small, with domed anterior margin and rather deep supracaudal incision.

Plastron

The plastral fragments are unfortunately not so satisfactorily preserved as the carapacial. Hence a complete reconstruction of plastron has not been possible.

Epiplastra shaped like robust characteristically bent bars. Right epiplastron notably well preserved. When compared to analogous plates of recent cheloniids of the same size, these epiplastrals are distinctly broader and flatter.

Hyoplastra fragmentary. A fragmentary right hyoplastral (see pl. II — 8) is particularly well preserved. It represents the reversed inner side of the left hyoplastron, provided with characteristic digit-like processes. An analogous small fragment of the right hyoplastral has been preserved on the opposite side of the specimen. The preserved fragments are notably robust considering the young age and small dimensions of the studied individual. A distinct depression in the inner bony surface does not resemble the plastral structure in recent cheloniids where the plastron of such young specimens is flat and thinner. The digit-like hyoplastral processes resemble these elements in somewhat older individuals of genus *Eretmochelys*. Strongly curved and directed anteriorly, the hyoplastral wing, provided with processes, resembles analogous plastral areas in some sea turtles, particularly those of *Glarichelys knorri* (Gray) (Zangerl, 1958).

Xiphiplastra excellently preserved (pl. I, II). They are flat robust plates, slightly sigmoid, with ends hardly curved. The terminal digital structure of these plates, particularly in the pygal area, so characteristic of cheloniids, is very distinct.

Bones of the shoulder girdle

The shoulder girdle bones of our specimen are excellently preserved. They are: both *coracoida*, *scapula* and *humerus*. The humerus, however, is not so satisfactorily preserved since its surface is concealed by small vertebral fragments. Only its contours have, therefore, been indicated (fig. 2). Among limb bones the radius is also in a satisfactory state of preservation. It is figured in the photograph on the left side of the specimen, between the coracoid and the epiplastron.

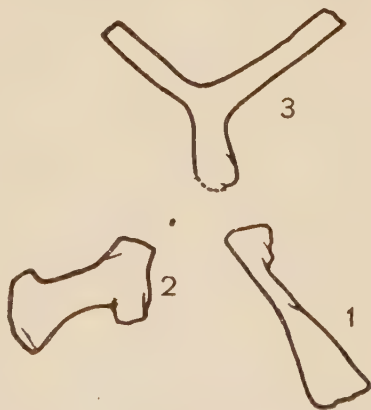


Fig. 2. — *Glarichelys knorri* (Gray), diagrammatic reconstruction of shoulder girdle in the Winnica specimen: 1 coracoid, 2 humerus, 3 scapula; × 2.

Scapula is shaped boomerang-like, as is characteristic of all sea turtles. *Processus acromialis* is here of nearly equal length with *proc. scapu-*

laris. This morphological feature characteristic of *Glarichelys knorri* (Gray) has been discussed at large by Zangerl (1958, p. 21—24). In young recent cheloniids, examined by the present writer, these two processes are of uneven length, confirming Zangerl's opinion. The *capitulum* of the *scapula* fairly well preserved.

Coracoida. Both these bones are well preserved, each differently oriented, making their structure readily discernible. They have a characteristic spade-like shape. There is a distinct bony crest on the inner surface. It forms a margin constituting the axis of the bone symmetry. This symmetric position of the crest is most likely a feature observable in very young individuals, analogously to recent young specimens of *Chelonia mydas* (L.).

Humerus short and robust, more so than the radius in recent forms. The bone is very slightly curved too. The general structural type of humerus corresponds to that described by Zangerl (*op. cit.*).

Radius of our specimen exhibits a structure similar to the structure of this bone in recent cheloniids and is without any individual features.

Summarily, the structure of the shoulder girdle in our specimen differs somewhat, in what concerns the here mentioned elements, from young recent cheloniids. E. g. the *scapula* is slightly longer (distance between ends of processes) than the *coracoid*, contrary to all recent young and adult cheloniids. A diagrammatic reconstruction of the shoulder girdle is given in fig. 2, showing the agreement of this skeletal portion to analogous elements in specimens from Glarus described by Zangerl (*op. cit.*, p. 21).

Fragment of pelvic girdle

Os pubis is the only preserved element of the pelvic girdle. Its state of preservation is sufficiently adequate to show the contour lines. In shape it resembles analogous bones of recent cheloniids, without notable deviations.

Fragments of digits of forelimbs

Digital phalanges of the left forelimb are fairly well preserved. They are probably the 1st and 2nd phalanges of the 3rd and 4th digits, also the 1st and fragmentary 2nd phalanges of the 5th digit. They are with well developed *capitula*. In the 2nd phalange of the 3rd digit (the only one completely preserved) even the structure of the articular surface is discernible. Nevertheless this is not a condyle, i. e. a surface permitting the free motion of digits. The presence of conspicuous *capitula* in phalanges is associated with the young age of the described specimen. It is equally observable in young recent sea turtles. Bony fragments of the right forelimb are preserved near the nuchale. They are, however, strongly

damaged, and may, therefore, only be supposed to represent the phalanges or *carpalia* of the longest (3rd) digit. Some of them are oriented at an acute angle. The terminal phalange is conspicuous by a strong and characteristic curvature. It is readily discernible on the left side of the specimen (see pl. I).

It should be stressed that in our specimen the several phalanges are slightly longer than those observed in recent sea turtles of the same size.

Impressions of cranial bones

Cranial fragments of the here considered individual are very few and in a very bad state of preservation. The cast, however, filling in the cranial cavity, is satisfactorily preserved, together with imprints of the parietal sutures. The inner structure of *ossa parietalia* is that most readily discernible. The preserved fragments of these bones are somewhat longer and less concave than those in recent specimens of *Chelonia mydas* (L.) with which they have been compared by the writer.

Sutures connecting the *frontale* with the *praefrontale* are not indicated. However, the suture connecting *parietalia* with *frontalia* is relatively distinct. The two last named elements in shape very closely resemble analogous bones in recent specimens of moderate dimensions. In the anterior area of the mentioned impressions well preserved casts are noted. They have been formed by the filling in of the nasal cavity, delimited by *maxillaria* and *intermaxillaria*, separated by the *vomer* and covered by *praefrontalia*. Imprints of the junctures of all these bones are fairly well preserved on the surface of casts.

In order to compare imprints of the inner skull surface the writer availed himself of some young specimens of *Chelonia mydas* (L.) collected from Ilha da Trindade. For this purpose he prepared the skull cap filling in the prepared bones with plastelin or wax. Casts analogous to the cast of the studied specimen were obtained by this method. On the whole, it was possible to ascertain that in our specimen the outer surface of parietal bones is flatter, while the *frontale* and *praefrontale* are slightly more elongate.

Imprints of carapacial horny scutes

Imprints of carapacial horny scutes are not so satisfactorily preserved as bone fragments. Imprints, or rather traces of scutes form a dark background of bituminous substance against which the scutes are outlined as light streaks. They are fairly distinctly indicated on the surface of fontanelle of carapacial scutes. Unfortunately, in the photograph these streaks are not readily discernible. It was necessary to use a lens in order to detect the contours of scutes.

Scuta marginalia fairly well preserved, permitting their reconstruction. There are eleven of them (I-XI). The latero-marginal ones are the most distinct. They are shaped like irregular quadrangles or pentagons. The outer scute margins slightly protrude beyond the carapacial margin, producing a faintly notched line. The marginal plates on which the considered scutes are inserted take up about 1/3 of the width of plates. Bone plate sutures never correspond with horny scute furrows in the marginal area. Scutes M I are missing in our material, while scutes M IX are damaged.

Scuta supracaudalia. On the presence of a complete right *scutum supracaudale*, and fragment of the left scute, it has been possible to reconstruct that part of the horny shell. They are pentagonal, with rectilinear regular margins, symmetrically separated from one another by furrows. These scutes resemble *scuta supracaudalia* in young individuals of *Chelonia mydas* (L.).

Scuta costalia and *scuta vertebralia*. Poorly preserved furrow imprints of *scuta costalia* permit the reconstruction of the lateral portions only. These scutes (C I-IV) are broad, regularly shaped and symmetrically arranged on either side of the carapace.

Scuta vertebralia have been approximately outlined in the writer's carapacial reconstruction. Owing to the inadequate state of preservation of the vertebral area of the carapace, the contours of only some of the vertebral scutes could be detected under the lens and placing the specimens in appropriate light. Hence, in the attached diagrammatic reconstruction of the carapace of *Glarichelys knorri* (Gray) from Winnica it was not possible to indicate the vertebral horny scutes as in other areas of the shell.

SYSTEMATIC POSITION

An accurate determination of the systematic position of the studied sea turtle remains meets with difficulties and cannot, therefore, be quite certain. These remains belong to an extremely young individual, almost a hatchling, probably one of the youngest fossil turtles so far described in palaeontological literature. The absence of the skull, of the hind limbs and the notably fragmentary state of the plastron are obstacles in the accurate determination of the systematic position. Taking account of these difficulties, these remain are — on a number of morphological characters, and their geological age and environment — assigned to a species described from the Oligocene of Switzerland, whose systematic position has lately been revised by Zangerl (1958). Hence the systematic position of the Winnica sea turtle is as follows:

Sectio **Chelonioidae**²Family **Cheloniidae**Genus *Glarichelys* Zangerl, 1958*Glarichelys knorri* (Gray, 1831) *iuv.*

1831. *Chelonia knorri* Gray; J. E. Gray, Synopsis Reptilium, p. 54.

1834. *Chelonia glaricensis* Keferstein; Ch. Keferstein, Naturgeschichte des Erdkörpers, p. 255.

1865. *Chelonia ovata* Heer; O. Heer, Die Urwelt der Schweiz, p. 235.

Locality: menilitic shales in Winnica near Jasło, Polish Carpathians.

Age: Lower Oligocene or Upper Eocene.

The here studied fossil remains have been assigned to the above species on following grounds:

1. Its general shell contour resembles that of the "*ovata*" form described by Heer, 1865 (*fide* Zangerl, 1958). As a whole the character of shell suggests its assignment to the *Chelonia-Eretmochelys* group (tribus Cheloniini; Zangerl, 1955-1958).

2. The morphology of the vertebral area of the carapace (*nuchale* and *neuralia*) approaches the morphology of analogous parts of shell in the specimens from Glarus. The presence of only eight neural plates in the Winnica specimen is recognized as an individual feature without taxonomic significance. The same applies to the presence of *foramina praenuchalia*.

3. The pygal area of the carapace exhibits the same structural type as is noted in the Swiss specimens. Moreover, it closely resembles the pygal carapacial area in juvenile representatives of the recent species *Eretmochelys imbricata* (L.).

4. The preserved plastral fragments, particularly so the winged hyoplastral fragment, have a shape typical of the mentioned fossil species.

5. The morphology of digital phalanges of forelimbs, as well as of the shoulder girdle which is an important taxonomic feature. Its description and correlation with the Swiss forms have been given in the preceding chapter.

GENERAL REMARKS ON *GLARICHELYS KNORRI* (GRAY)

The first fossil remains of turtles which, on evidence now available have been referred to *G. knorri* (Gray), were described nearly two hundred years ago by G. W. Knorr and J. E. J. Walch, 1773 (*fide* Zangerl, 1958). They were discovered in Switzerland, in canton Glarus, from shales containing an abundant fauna of early Tertiary fishes. These beautifully

² Systematic after Mertens & Wermuth, 1955.

preserved turtle remains were later re-described and cited by several outstanding writers of the first half of the XIX century. Among others, G. Cuvier (1825) also referred these fossil remains to a recent European species *Emys orbicularis* (L.), at the same time postulating that this sea turtle had since very remote geological times inhabited the lakes of Switzerland. In Zangerl's opinion, the specific name had been established by Gray (1831) in his renowned work "Synopsis Reptilium".

The first more detailed description of this turtle was given by H. v. Meyer (1856) who had the opportunity of examining these remains in the collections of the Zurich University.

Detailed information concerning the history of *Glarichelys knorri* (Gray) has been published by Zangerl (1958). That author was able to acquaint himself with the holotype „*Chelonia*“ *knorri* described by Gray (1831), as well as with other fossil remains of sea turtles. After a close morphological analysis they were referred by him to the here studied species. Studies on these turtles led Zangerl to a revision of the systematic position of the Glarus turtles and to the establishment of a generic name to include them. At the same time species described by Heer (1865) and Kefersteine (1834) were by Zangerl recognized as synonyms of *Glarichelys knorri* (Gray).

It is certainly a noteworthy fact that the state of preservation of the Glarus turtles is very similar to that of fossil remains found in Winnica near Jasło. Our specimen and the "ovata" form described by Heer (1865) have both been dorso-ventrally compressed and beautifully preserved in shales formed by petrification of bottom slime.

REMARKS ON FOSSIL AND RECENT CHELONIIDAE

Zangerl (1958) has given a most interesting review of thus far described species which either belong or are allied to the family Cheloniidae (s. lat.). In order not to repeat data published by that author the present writer will confine his statements to a brief account of his personal comparisons and observations concerning the studied systematic group in its relation to the Polish specimen.

A correlation of the Winnica turtle remains with the fossil remains of cheloniids is difficult owing to the scarcity of descriptions of ontogenetically younger forms. Moreover, the majority of descriptions are based on preserved skulls or long bones of large individuals (e.g. R. Lydekker, 1889; O. P. Hay, 1908b; C. W. Gilmore, 1937; E. Daqué, 1912; F. Rüschkamp, 1926, and others).

Making allowances for differences in size and degree of fossilization of the correlated individuals, the here described remains may be said to

bear quite strong resemblance to the fossil remains of *Chelonia gwinneri* Wegner, described in 1914 by Th. Wegner from the Oligocene of Germany. In that author's opinion the presence of one free claw in the paddle-like forelimbs, as well as a number of other morphological characters, indicate the assignment of this turtle to genus *Chelonia* Latreille. After Zangerl (1958), however, the systematic position of this species calls for revision, its forelimbs being of a type structurally different than that noted in recent genera of the sea turtle, and thus suggesting another specialization. The present writer believes that the plastron of *Ch. gwinneri* Wegner shows more similarities to that in genus *Eretmochelys* Fitzinger than to that in *Chelonia*. The so-called sternal index (Brückenindex) of the studied form—as determined by Zangerl (*op. cit.*)—is typical of representatives of the caretine group (*tribus*). The writer supposes that *Ch. gwinneri* (Wegner) belongs to some separate evolutionary line of fossil cheloniids. It displays features common to both recent groups, Caretteni and Cheloniini, but no close relationships to our sea turtle from Winnica. On the base of the plastral morphology shown in Wegner's reconstruction (1914) it may reasonably be inferred that this turtle is notably more primitive than *Glarichelys knorri* (Gray), among others in xiphiplastral structure.

Chelonia sismondai (Portis) (A. Portis, 1890; A. Fucini, 1909; R. Zangerl, 1958) exhibits conspicuous differences of morphology as compared with the Winnica specimen. The latter is with a completely different type of plastron, deprived of the inner winged hyoplastral processes. According to Zangerl (*op. cit.*) this Pliocene species, recorded from the wide known Valdarno exposures, most likely belongs to genus *Chelonia*, as is, *inter alia*, suggested by its sternal index.

To end up his notes on fossil cheloniids the writer wishes to mention the numerous sea turtle remains from the London Clay, first described by R. Owen and T. Bell (1849) and later revised by R. Lydekker (1889). On the base of these descriptions and excellent lithographs published by Owen and Bell (*op. cit.*), it is supposed that the London Clay turtles contain representatives of various marine forms besides those of family Cheloniidae *s. str.* The systematic position of these forms, as well as of all fossil sea turtles, described or revised by earlier authors, has lately been revised in detail by E. Williams (*fide* Zangerl, 1958). The present writer has not succeeded to find among these forms any remains bearing similarities to the Winnica specimen.

Among the recent forms *Eretmochelys imbricata* (L.) bears closest resemblance with the discussed turtle remains. In the first place this is observable in plastral morphology. Regretfully, owing to the fragmentary preservation of our remains it has not been possible to determine the sternal index of the Winnica specimen.

FORAMINA PRAENUCHALIA IN CHELONIIDAE

Distinct *foramina praenuchalia* occur in representatives of *Glarichelys knorri* (Gray) from the Swiss Oligocene, also in our specimen. These elements have so far been considered by O. P. Hay (1908), F. v. Huene (1956) and others, as a diagnostic morphological character. However, it has not actually been possible to ascertain their presence in all of the known representatives of that fossil Mesozoic group. According to Zangerl (1953), e. g. they do not occur in such genera as *Osteopygis* (Osteopyginae), *Prionochelys* and others. Similar *foramina praenuchalia* are sporadically encountered in recent representatives of the cheloniids. When examining, in Brazilian scientific institutes, the turtle shells of *Chelonia mydas* (L.) this writer noted the presence of typical *foramina praenuchalia* in a mature but rather small specimen from the neighbourhood of Santos, deposited in the Departamento de Fisiologia Geral e Animal da Universidade de São Paulo. Moreover, in other conspecific specimens he observed *foramina praenuchalia* — either single or of uneven size — similar to those probably possessed by the here described *Glarichelys knorri* (Gray). The presence of *foramina praenuchalia* in recent sea turtles has been repeatedly noted by Dr. Zangerl in specimens examined by that author in museums and scientific institutions of the U. S. A. (letter communication).

The occurrence of these *foramina* in representatives of *Glarichelys knorri* (Gray) is by Zangerl (1958) held as a merely transitional feature. He suggests that they would have probably occurred during further ontogeny (*op. cit.*, p. 17). *Foramina praenuchalia*, sporadically present in cheloniids, are vestiges persisting from the stage of the early ossification of the shell. They are probably connected with certain disturbances in the normal ontogeny. Conclusions concerning phylogenetic relationship between Toxochelyidae and Cheloniidae, drawn on the mentioned morphological characters, may be incorrect.

Hence, the presence of *foramina praenuchalia* in representatives of *Glarichelys knorri* (Gray) cannot be regarded as a feature characteristic of this form, or as being of taxonomic significance here.

PHALANGES OF SEA TURTLES

The presence or absence of condyles in digital phalanges of sea turtles is an important taxonomic character. The presence of condyles, permitting the motion of digits, is undoubtedly a primitive character in marine turtles. It is believed to be one of the diagnostic taxonomic features in the separation e. g. of Toxochelyidae from Cheloniidae (Hay, 1908a; Huene, 1956, and others). Zangerl (1953) likewise states that toxocheliids were able more freely to bend the digits of their forelimbs.

In the remains of young *Glarichelys knorri* (Gray) from Winnica the few digital phalanges are strongly thickened in the diaphysal area, having the semblance of condyles (see photograph). Similar thickenings are always encountered in very young individuals; however, they are not the typical condyles enabling the digits to bend. Therefore, the differentiation in fossil materials of true condyles from thickenings similar to those here described presents considerable difficulties.

ON BIOLOGY AND ECOLOGY OF THE SEA TURTLE FROM WINNICA

In the writer's opinion, the presence in menilitic shales of Winnica of the remains of young sea turtles testifies to the littoral character of the fauna in that area. This is also indicated by the find, besides the other missing specimen, of the impression of a land plant. On the writer's own observations of young recent sea turtles, in size corresponding to the Winnica specimen, the occurrence of such individuals is associated with an off-shore environment, being only occasionally encountered in pelagic areas. Research work, done concerning the fish fauna of these areas by Jerzmańska (1958), confirms the supposition as to the littoral character of the marine fauna near Jasło. The presence in early Tertiary deposits of the Polish Carpathians of young specimens of *Glarichelys knorri* (Gray) suggests certain faunistic similarities between this area and that of canton Glarus in Swiss. Most likely some islands of a beachy sea shore, favourable for the laying of reptile eggs, must have existed near the locality that yielded the discussed turtle remains.

Zangerl (1958) supposes that *G. knorri* (Gray) was a turtle of moderate size, frequenting the calm waters of fiord-like sea bays (*op. cit.*, p. 27-28). In his opinion, the state of preservation of the Glarus specimens does not suggest their fossilization at greater depth. The here discussed remains have been preserved under similar environmental conditions. They experienced rapid fossilization in a shallow bay on an argillaceous floor, where petrification set in very soon.

Certain similarities of *G. knorri* with the recent species of *Eretmochelys imbricata*, and the Tertiary faunal finds from the vicinity of Jasło so far available, suggest that climatic conditions prevailing there were similar to the present climate near Ceylon or in the tropical areas of the Atlantic Ocean.

REFERENCES

- BERGOUNIOUX, F. M. 1955. Testudinata. In: Piveteau, J., *Traité de Paléontologie*, 5, 487-544, Paris.
- BOULENGER, G. A. 1889. Catalogue of Chelonians, Rhynchocephalians and Crocodiles in the British Museum (Nat. Hist.). Part. 3, 1-311, London.
- CARR, A. 1952, Handbook of Turtles. The Turtles of the United States, Canada and Baja California. 1-542, Ithaca.
- CUVIER, G. 1825. Recherches sur les ossements fossiles. 5, 2, 1-243, Paris.
- DAQUÉ, E. 1912. Die fossilen Schildkröten Aegyptiens. — *Geol. Paläont. Abh.*, 10, 4, 275-333, Wien.
- DERANYIAGALA, P. E. P. 1953. Colored atlas of some vertebrates from Ceylon. 2: Tetrapoda Reptilia, 1-101, Colombo.
- FUCINI, A. 1909. La Chelone Sismondai Port. del Pliocene di Oriciano in Provincia di Pisa. — *Palaeontogr. Ital.*, 15, 101-123,
- GILMORE, C. W. 1937. A new marine turtle from the Miocene of California. — *Proc. Calif. Acad. Sci.*, 4 ser., 23, 10, 171-174, California.
- GRAY, J. E. 1831. Synopsis Reptilium. Part 1, 1-72, London.
- GREGORY, W. K. 1951. Evolution Emerging. 1 & 2, 1-736+1-1009, New York.
- HAY, O. P. 1908a. The fossil turtles of North America. — *Carnegie Inst. Publ.*, 79, 1-568, Washington.
- 1908b. On three existing species of sea-turtles, one of them (*Caretta remivaga*) new. — *Proc. U. S. Nat. Mus.*, 34, 183-198, Washington.
- HUENE, F. v. 1956. Paläontologie und Phylogenie d. niederen Tetrapoden. 1-716, Jena.
- JERZMAŃSKA, A. 1958. Stan badań nad rybami trzeciorzędowymi w Polsce (Status of research on Tertiary fishes of Poland). — *Kwart. Geol.*, 2, 1, 177-186, Warszawa.
- *KEFERSTEIN, Ch. 1834. Naturgeschichte des Erdkörpers usw. 2, Leipzig.
- *KNORR, G. W. & WALCH J. E. J. 1773. Die Naturgeschichte der Versteinerungen zur Erläuterung der Knorr'schen Sammlung von Merkwürdigkeiten der Natur. 1-2, Nürnberg.
- LYDEKKER, R. 1889. Catalogue of the fossil Reptilia and Amphibia in the British Museum (Nat. Hist.). Part 3: Chelonia, 1-239, London.
- MERTENS, R. & WERMUTH, H. 1955. Die rezenten Schildkröten, Krokodille und Brückenechsen. — *Zool. Jb. (Syst.)*, 83, 3, 323-440, Jena.
- MEYER, H. v. 1856. Schildkröte und Vogel aus dem Fischschiefer von Glarus. — *Palaeontographica*, 4, 84-91, Stuttgart.
- OWEN, R. & BELL, T. 1849. 58. Monograph on the fossil Reptilia of the London Clay. 1-76, London.
- PORTIS, A. 1890. Rettili pliocenici del Valdarno. Firenze.
- RÜSCHKAMP, F. 1926. Die Seeschildkröte der Maastrichter Kreide. Ein Schödel von Allopleuron (Chelone) Hoffmanni Gray. — *Palaeont. Ztschr.*, 6, 122-140, Berlin.
- SHIKAMA, T. 1956. Miocene Chelonia of Japan. — *Sci. Rep. Yokohama Nation. Univ.*, 2, 5, 35-62, Yokohama.
- SIEBENROCK, F. 1909. Synopsis der rezenten Schildkröten usw. — *Zool. Jb.*, Suppl. 10, 427-618, Jena.
- SZALAI, T. 1934. Die fossilen Schildkröten Ungarns. — *Folia Zool. Hydrobiol.*, 6, 97-142, Riga.
- WEGNER, Th. 1914/18. Chelonia gwinneri Wegner aus dem Rupelton von Flörsheim. — *Abh. senckenberg. naturf. Ges.*, 36, 361-372, Frankfurt a.M.

- ZANGERL, R. 1953. The vertebrate fauna of the Selma Formation of Alabama. 4: The Turtles of the family Toxochelyidae. — *Fieldiana: Geol. Mem.*, 3, 4, 137-277, Chicago.
- 1958. Die oligozänen Meerschilddrüsen von Glarus. — *Abh. Schweiz. Palaeont. Ges.*, 73, 1-56, Basel.
- ZANGERL, R. & TURNBULL, W. D. 1955. Procolpochelys grandaeva (Leidy), an early Carettine sea turtle. — *Fieldiana: Zool.*, 37, 345-382, Chicago.

* Papers noted by asterisks were inaccessible for the author.

MARIAN MŁYNARSKI

GLARICHELYS KNORRI (GRAY) — ŻÓŁW MORSKI Z ŁUPKÓW MENILITOWYCH KARPAT

Streszczenie

Praca niniejsza zawiera opis szczątków młodego osobnika żółwia morskiego, pochodzącego z łupków menilitowych z miejscowości Winnica koło Jasła, znalezionego przez Dra S. Kadyia z Jasła.

W części opisowej podano dokładną charakterystykę zachowanych szczątków oraz przeprowadzono szereg porównań poszczególnych części z współczesnymi i kopalnymi żółwiami morskimi.

Uzasadniając stanowisko systematyczne omawianego okazu zaliczam go do gatunku *Glarichelys knorri* (Gray) (Cheloniidae), opisanego z oligoceńskich warstw kantonu Glarus w Szwajcarii. Przy określaniu stanowiska systematycznego opierałem się przede wszystkim na najnowszej, monograficznej rewizji kopalnych żółwi szwajcarskich R. Zangerla (1958).

W części ogólnej podaję kilka uwag dotyczących morfologii i taksonomii kopalnych i współczesnych żółwi morskich. Uwagi te dotyczą typów budowy pancerza brzuszno u poszczególnych rodzajów współczesnych, występowania otworów prenuchalnych (*foramina praenuchalia*) u współczesnych przedstawicieli rodziny Cheloniidae oraz morfologii palców u młodych osobników tej samej grupy systematycznej.

Na zakończenie podano kilka uwag o warunkach życia żółwi morskich w trzeciorzędzie w regionie Jasła. Panował tam przypuszczalnie klimat tropikalny lub subtropikalny oraz znajdował się brzeg morski lub wyspy, umożliwiające żółwiom składanie jaj.

Przy przygotowywaniu niniejszej publikacji korzystałem z materiałów współczesnych, znajdujących się w kilku zakładach naukowych w Brazylii, oraz z materiałów zebranych osobiście na wyspie Ilha da Trindade na Atlantyku Południowym.

OBJAŚNIENIA DO ILUSTRACJI

Fig. 1. (p. 179)

Rekonstrukcja karapaksu młodego osobnika *Glarichelys knorri* (Gray) z Winnicy; wielk. nat.

Fig. 2 (p. 181)

Glarichelys knorri (Gray), schematyczna rekonstrukcja kości pasa barkowego okazu z Winnicy: 1 coracoid, 2 humerus, 3 scapula; $\times 2$.

Pl. I

Fotografia młodego osobnika *Glarichelys knorri* (Gray) z Winnicy; prawie wielk. nat.

Pl. II

Schematyczny rysunek ułatwiający znalezienie poszczególnych fragmentów na załączonej fotografii: 1 ośródka czaszki wraz z fragmentami kostnymi, 2 płytka nuchalna, 3 humerus, 4 scapula, 5 carpalia (?), 6 płytki kostalne, 7 kości korakoidalne, 8 fragmenty hyoplastronów, 9 płytki marginalne, 10 płytki ksifiplastralne, 11 os pubis, 12 płytki neuralne, 13 płytka epiplastralna, 14 fragmenty falang, 15 kość radialna, 16 płytka suprapygalna, 17 bruzdy tarczek kostalnych, 18 odciski tarczek marginalnych

МАРИАН МЛЫНАРСКИ

GLARICHELYS KNORRI (GRAY) — МОРСКАЯ ЧЕРЕПАХА ИЗ МЕНИЛИТОВЫХ СЛАНЦЕВ КАРПАТ

Резюме

Настоящая работа содержит описание остатков молодой особи морской черепахи, найденной Др-ом С. Кадыи в менилитовых сланцах в местности Винница близь г. Ясло.

В описании дана подробная характеристика сохранившихся остатков и сравнение отдельных частей современных и ископаемых морских черепах.

Обосновывая систематическое положение этого образца автор причисляет его к виду *Glarichelys knorri* (Gray) (Cheloniidae), описанному из олигоценовых отложений кантона Гларус в Швейцарии. Определяя систематическую принадлежность, автор основывался прежде всего на самой новой монографической ревизии швейцарских ископаемых черепах Р. Цангерля (R. Zangerl, 1958).

В общей части автор приводит некоторые замечания, касающиеся морфологии и таксономии ископаемых и современных морских черепах, а главным образом наличия пренухальных отверстий (foramina praenuchalia) у современных представителей семейства Cheloniidae и морфологии пальцев у молодых особей этой же систематической группы.

Затем автор высказывается по поводу условий жизни морских черепах в районе г. Ясло в третичном периоде. По всей вероятности господствовал там в те времена тропический или субтропический климат, а в близости должен был находиться морской берег или острова, дающие черепахам возможность кладки яиц.

При обработке описанного образца автор пользовался современными материалами, находящимися в нескольких научных институтах в Бразилии, и собранными лично автором на острове Триндаде в южной части Атлантического океана.

P L A T E S



Glarichelys knorri (Gray), Winnica specimen, photograph; approx. nat. size.



Diagram of the photograph: 1 cast of skull and bone fragments, 2 nuchal plate, 3 fragmentary phalanges, 4 scapula, 5 carpalia (?), 6 costal plates, 7 coracoids, 8 fragmentary hyo- and xiphiplastrals, 9 marginals, 10 xiphiplastrals, 11 os pubis, 12 neural, 13 epiplastron, 14 fragmentary phalanges, 15 radius, 16 suprapygial plate, 17 furrows of costal plates, 18 imprints of cranial bones.

FRANCISZEK ADAMCZAK

SUR CERTAINES MODIFICATIONS PENDANT L'ONTOGENÈSE DES OSTRACODES DÉVONIENS

Sommaire. — Dans cette note est faite l'analyse du développement ontogénétique de 9 espèces d'Ostracodes du Dévonien moyen des Monts de Sainte-Croix (Góry Świętokrzyskie). L'auteur a pu constater que les caractères nouveaux font leur apparition au cours de l'ontogenèse suivant différentes modalités: tantôt par la voie de *protérogenèse* (Schindewolf), tantôt par celle de *prolongation* des stades terminaux (Franz) ou *anabolie* (Severtzoff), tantôt enfin par celle de *déviatio*n (Franz, Severtzoff).

Il est assez généralement admis que les modifications des caractères phylogénétiques se produisent pendant l'ontogenèse de l'animal. L'étude de l'ontogenèse a une importance particulière quand il s'agit d'établir les affinités des formes étudiées, ainsi que l'ordre d'apparition chez elles des caractères nouveaux.

Partant des études d'Ostracodes dévoniens, basées sur des matériaux très abondants et particulièrement bien conservés recueillis dans les Monts de Sainte-Croix (Góry Świętokrzyskie) en Pologne, je vais esquisser quelques-unes des observations relatives à l'ontogenèse de ces Crustacés.

Ces observations ont été faites sur 9 espèces appartenant à deux genres: *Kozłowskiella* (Příbyl, 1953), et *Poloniella* Gürich, 1896 (= *Dizygo-pleura* Ulrich & Bassler, 1923).

Le premier fait constaté est que les différentes modifications des caractères phylétiques se produisent aux différents stades de l'ontogenèse. On observe que, dans les limites des espèces appartenant aux deux genres mentionnés, les caractères nouveaux peuvent apparaître soit par voie de protérogenèse (Schindewolf, 1929, 1950), soit par celle de prolongement des stades terminaux (Franz, 1927, 1931) ou d'anabolie, suivant la terminologie de Severtzoff (1931), soit, enfin, par la déviation (Franz, Severtzoff).

L'évolution par le prolongement des stades terminaux peut fournir d'excellents critères quant aux caractères ancestraux, car les modifications

qui s'ajoutent graduellement (par voie de petites mutations) sont récapitulées et fournissent une base à la reconstitution du cours de la phylogénèse. Mais les caractères palingénétiques, surtout quand il s'agit de petites unités taxonomiques, sont passagers.

Dans l'établissement des voies de l'évolution, la base la plus solide est fournie par des études comparées des ontogénèses.

Le développement post-embryonnaire des Ostracodes récents, c'est-à-dire les principales phases de croissance et le stade terminal de la morphogénèse, présentent des relations assez variables. Le nombre de mues n'est pas fixe, variant entre 5 et 9. La diminution du nombre de mues ne signifie nullement qu'il y ait eu une maturité sexuelle prématurée (dans le sens de l'abréviation de Franz), mais que les premiers stades ont été en quelque sorte absorbés par le développement embryonnaire dans l'oeuf. Il en résulte que la larve sort de l'oeuf au stade de métanauplius et ne passe ensuite que par les stades plus avancés. Si, par exemple, chez une espèce *A* il y a 8 mues et chez une autre — *B* — seulement 6, c'est que la première mue de l'espèce *B* correspond à la troisième de l'espèce *A*.

Chez les Ostracodes paléozoïques le nombre de stades ontogénétiques est très variable. Souvent il dépasse 8, c'est-à-dire la norme de la plupart des espèces récentes.

Partant de mes observations je suis enclin à admettre que chez certains Palaeocopa fossiles la période larvaire était sensiblement plus longue que chez les formes récentes. Elle était compensée peut-être par une reproduction plus intense, comme semblent l'indiquer les différents types des poches à couvée.

Les études faites jusqu'ici sur l'ontogénèse des Ostracodes fossiles (Verworn, 1887; Kellett, 1933; Cooper, 1945; Hessland, 1949; Egorov, 1950; Sohn, 1950; Spjeldnaes, 1951; Scott, 1951; Kesling, 1952, 1953; Kesling & Soronen, 1957; Malz, 1956; Martinsson, 1956; Adamczak, 1956, 1958) ont prouvé que le nombre de stades oscille entre 6 et 11.

La plupart des travaux consacrés à l'ontogénèse ont un caractère descriptif, et peu nombreux sont les auteurs qui ont utilisé ces observations pour l'établissement de la systématique et de la phylogénèse.

Le premier essai d'appliquer les données de l'ontogénèse à la taxonomie des Ostracodes a été fait par Egorov (1950). Mais les observations faites dans ce domaine sont encore trop sporadiques pour qu'il soit possible de se faire une idée claire du problème. Néanmoins, on a établi les méthodes d'investigation permettant de distinguer les stades successifs du développement. Très importante est l'application du principe de Brooks à l'analyse de l'ontogénèse, comme cela a été mis en évidence par les travaux de Cooper (1945) et surtout de Kesling (1951, 1952, 1953, 1957).

Grâce à ces travaux, il est possible d'établir, en s'appuyant sur les observations de l'ontogenèse comparée, le mode d'évolution des groupes particuliers.

L'établissement précis des stades de croissance a une importance essentielle pour déterminer „quand et comment” apparaissent les caractères nouveaux dans les lignées phylétiques. Il conduit en outre à comprendre la vitesse de ces modifications.

Du point de vue de la systématique, l'étude de l'ontogenèse permet d'éviter l'introduction des espèces basées sur des individus jeunes, — erreur souvent commise.

Etant donné les différents modes de changements phylogénétiques, il est impossible, en se basant seulement sur la morphologie de la carapace adulte, d'élucider les voies d'évolution et les réelles affinités.

L'étude des Ostracodes mésodévonien de Pologne, tant des formes adultes que des individus appartenant à tous les stades de croissance, m'a persuadé que seulement l'ontogenèse et l'analyse des changements, qui ont lieu pendant ce procès, donnent la garantie que la phylogenèse ainsi établie s'approche de la phylogenèse réelle.

L'ontogenèse pour les Ostracodes fossiles se termine avec le stade dans lequel apparaissent les caractères sexuels secondaires. Pour l'analyse, dont les résultats sont résumés plus bas, on a choisi exprès des espèces à dimorphisme sexuel de la carapace nettement exprimé, éliminant ainsi les erreurs possibles.

On a pu constater l'apparition d'éléments morphologiques nouveaux, tant aux stades précoces que vers le milieu de l'ontogenèse, aux stades avancés, ainsi qu'au stade de maturité sexuelle. Le mode différent d'apparition des changements n'est pas lié à un groupe systématique déterminé, par exemple à un genre.

Dans un seul cas on a pu observer des changements si importants du développement aux stades précoces qu'il fallait placer l'espèce qui les présentait dans une famille à part.

Après ces remarques de caractère général, je vais présenter certaines de mes observations sur l'ontogenèse, faites sur quatre espèces du genre *Kozłowskiella* Přibyl et trois espèces du genre *Poloniella* Gürich.

Le développement ontogénétique des espèces du premier de ces genres est le plus typique et à la fois le plus simple. Il a été possible de rassembler des séries ontogénétiques complètes pour chacune des quatre espèces (Adamczak, 1958). Les matériaux, très abondants, ont été recueillis dans le Couvinien inférieur et le Givétien supérieur. Dans le Couvinien se présentent trois espèces: *K. praetuberculata* Adamczak, *K. tuberculata* Adamczak et *K. similis* Adamczak. Dans le Givétien — une espèce seulement: *K. kozłowskii* (Přibyl). Les formes aux stades précoces de ces espèces, se

ressemblent fortement (Adamczak, 1958, pl. 1). Leur caractère commun consiste dans leur ornementation réticulée et dans la présence le long du bord libre de la carapace d'un "velate ridge" (fig. 1). Les carapaces sont bilobées dans les trois premiers stades et présentent un sillon médian (S_2)

bien exprimé. A partir du stade IV apparaît le sillon antérieur (S_1) et on peut distinguer trois lobes (L_1 — L_3).

Le tableau ci-dessous est destiné à illustrer deux principales modifications qui se manifestent lors de l'ontogenèse de quatre espèces de *Kozłowskiella*.

Chez *K. praetuberculata*, atteignant le maximum de développement au Couvinien, des menus tubercules apparaissent à partir du stade V sur le lobe L_3 (tabl. 1). La crête du velum est relativement étroite et la poche à couvée est située du côté postéro-central (Adamczak, 1958, pl. 1).

Chez *K. tuberculata*, dont les adultes sont un peu plus grands, les tubercules au lobe L_3 apparaissent déjà au stade III et

Fig. 1. — *Kozłowskiella praetuberculata* Adamczak: carapace gauche de l'individu jeune; $\times 40$

S_1 sillon antérieur, L_2 lobe médian, S_2 sillon médian, L_3 lobe postérieur, t tubercules, $v.r.$ „velate ridge“.

sont plus grands. La crête du velum est plus large et la poche à couvée est située ventralement.

K. kozłowskii, propre au Givétien, ressemble sensiblement aux stades juvéniles de *K. tuberculata*. Les tubercules du lobe L_3 apparaissent au

Tableau 1

Stades	<i>K. similis</i>	<i>K. praetub.</i>	<i>K. tuberc.</i>	<i>K. kozłowskii</i>
adulte	b	a	a	b
VIII	b	a	a	b
VII	b	a	a	b
VI	b	a	a	a
V	b	a	a	a
IV	b	—	a	a
III	b	—	a	a
II	—	—	—	a
I	—	—	—	—

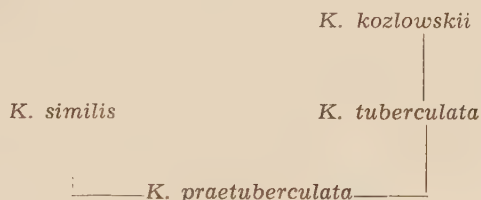
a — tubercules sur le lobe L_3 , b — grand tubercule sur le lobe L_3 .

stade II et se repètent jusqu'au stade VI inclusivement. Au stade VII apparaît un caractère nouveau: un gros tubercule (b) sur le lobe L_3 .

Les formes juvéniles de *K. similis* dévient, à partir du stade III, de

l'ontogenèse des espèces précédentes, car ici sur le lobe L_3 , au lieu de menus tubercules, apparaît déjà un gros tubercule semblable à celui qui chez *K. kozlowskii* n'apparaît qu'au stade VII.

De la comparaison des ontogenèses des quatre espèces citées il s'ensuit qu'il y a deux modes de différenciation d'un élément homologue de la carapace. En partant de ce fait on peut représenter de la manière suivante les relations phylogénétiques de ces espèces :



Malgré ces différences manifestées lors de l'ontogenèse, le nombre de mues n'a pas été modifié. Le coefficient de croissance de ces espèces est égal en moyenne à 1,24.

Quoique le développement de *K. similis* s'est effectué d'une manière différente que celui de *K. kozlowskii*, ces deux espèces ont néanmoins plusieurs éléments communs, en particulier un tubercule (*b*) homologue sur le lobe L_3 . Il est probable que chez *K. similis* les modifications étaient liées à des mutations plus rapides que chez *K. kozlowskii*. Mais tandis que chez *K. kozlowskii* le lobe L_3 est nettement hypertrophique aux stades avancés et est lié à un déplacement vers l'avant de la poche à couvée, chez *K. similis* le tubercule *b* ne trahit aucune tendance à l'hypertrophie et la poche est placée ventralement. Comme le développement de *K. similis* s'écarte nettement aux stades précoces du développement de trois autres espèces, ce phénomène peut être qualifié de déviation dans le sens qu'ont donné à ce terme Franz et Severtzoff. Les premiers stades (I et II) de *K. similis* sont en principe semblables à ces stades chez l'espèce ancestrale *K. praetuberculata*, qui est la plus primitive.

La lignée conduisant à *K. kozlowskii* présente des modifications de caractère différent. Ici la nouvelle phase d'accroissement vient s'ajouter vers la fin du développement et correspond, par conséquent, au phénomène de prolongation de Franz (1927) ou d'anabolie de Severtzoff (1931). Le nombre de mues reste le même, mais on observe une substitution de phases de croissance (tabl. 1), une compression au dépens du nouveau stade morphologique (Kryjanovsky, 1939).

Chez *K. praetuberculata*, espèce qui peut être considérée comme ancestrale des autres représentants du genre *Kozlowskiella*, les caractères

nouveaux se déplacent vers les stades de plus en plus précoces. Cela se déduit de la comparaison des stades juvéniles de *K. praetuberculata* avec les mêmes stades de *K. tuberculata*, chez laquelle ces caractères sont récapitulés à partir du stade III. Mais, prenant en considération la direction de déplacement de ces caractères, il ne semble pas que chez *K. tuberculata* (descendant) il y ait seulement une simple récapitulation des caractères des formes adultes. Ces caractères (tubercules) ne sont pas identiques avec ceux des adultes chez la forme ancestrale. Tout en étant récapitulés, ils sont soumis aux mêmes lois de croissance et d'évolution comme les autres organes de l'animal. Cela est confirmé par l'analyse des formes juvéniles de *K. kozlowskii* où les caractères ancestraux récapitulés, quoique typi-

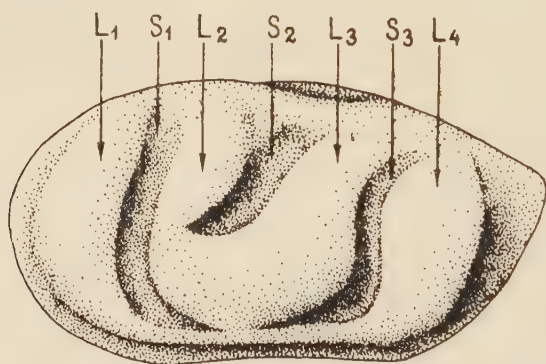


Fig. 2. — *Poloniella tertia* Krömmelbein: carapace gauche de la femelle; $\times 61$

$L_1 - L_4$ lobes antérieur, médian, postérieur et dernier, $S_1 - S_3$ sillons antérieur, médian et postérieur.

quement palingénétiques, sont un peu modifiés par rapport à l'ancêtre direct (*K. tuberculata*).

Il faut ici souligner le caractère „mobile” des éléments récapitulés qui se déplacent tantôt vers les stades avancés, tantôt vers les précoces, suivant leur genèse. Nonobstant ces déplacements, le nombre de stades (la durée de l'ontogenèse) ne subit aucune modification dans les limites des petites unités taxonomiques.

Le développement ontogénétique du genre *Poloniella* Gürich présente une image plus compliquée que celle de *Kozlowskiella*. Dans l'analyse de l'ontogenèse des représentants de ces genres nous nous limiterons aux trois caractères pour un groupe d'espèces, et à un caractère pour un autre groupe. Les espèces réparties dans ces deux groupes, tout en présentant le même type d'ornementation, de dimorphisme et de charnière, ont une

histoire différente. Mais dans ce bref exposé je me limiterai à n'indiquer que les principales modifications qui se manifestent au cours du procès d'accroissement.

De même que chez *Kozłowskiella* les modifications se produisent aux différents stades de croissance et restent, selon toute probabilité, en relation avec des modifications dans la structure des parties molles. Dans un cas (*P. kielanae* Přibyl, par exemple) elles semblent être liées directement aux dimensions de la poche à couvée.

Le genre *Poloniella* est caractérisé par la présence de trois sillons (S_1 , S_2 , S_3) orientés normalement au bord dorsal (fig. 2). Chez *P. devonica* Gürich, qui doit être considérée comme ancêtre de *P. kielanae*, les sillons sont nettement exprimés, tandis que chez la dernière espèce la carapace de la femelle n'a que deux sillons antérieurs (tabl. 2). La modification se produit ici après la dernière mue. Les formes juvéniles et les carapaces des mâles sont plus conservatives. La nouvelle morphologie réalisée par la carapace femelle correspond donc au phénomène de prolongation.

Le schéma ci-dessous est destiné à illustrer l'apparition d'un caractère nouveau (*d*) sur les carapaces des femelles de *P. kielanae*:

Tableau 2

Stades	<i>P. devonica</i>	<i>P. kielanae</i>
adulte ♂	c	c
♀	c	d
VII	c	c
VI	c	c
V	c	c
IV	c	c
III	c	c
II	—	—
I	—	—

c — carapace à 3 sillons, d — carapace à 2 sillons,

Dans le deuxième groupe d'espèces, trois caractères subissent des modifications, mais pas simultanément. A ce groupe j'attribue trois espèces du genre *Poloniella* apparaissant aux différents niveaux du Dévonien moyen. Chaque caractère va être analysé séparément.

Comme une partie de ces espèces n'est pas encore décrite, pour simplifier les considérations qui suivent, je les désignerai par les symboles P_1 , P_2 et P_3 , dans l'ordre de leur distribution stratigraphique. Les trois caractères analysés seront désignés par les symboles X, Y et Z.

Le tableau 3 est destiné à illustrer le résultat de l'analyse de ces trois caractères.

Prenant en considération les ontogenèses de ces trois espèces et leur distribution stratigraphique, on arrive à la conclusion que de l'espèce P_1 ont dérivé indépendamment les espèces P_2 et P_3 .

Tableau 3

Stades	E s p è c e s		
	P_1	P_2	P_3
adulte	Z	—	X
VII	Y Z	X	X Y
VI	X Y Z	X	X Y
V	X Y Z	X	X Y
IV	X Y Z	X Z	X Y
III	X Y Z	X Y Z	X Y
II	?	X Y Z	?
I	?	?	?

Le nombre de stades dans toutes ces espèces, établi au moyen du coefficient de croissance, est égal à 8.

Le caractère X se présente chez l'espèce P_1 aux stades jeunes, jusqu'au VI inclusivement. Chez P_2 ce caractère se déplace aux stades plus avancés, apparaissant au stade VII. Chez P_3 (du Givétien) le caractère X se manifeste dans tous les stades de l'ontogenèse, y compris le stade adulte. Prenant en considération la direction de déplacement du caractère X , il est à supposer que ce caractère anticipait son établissement définitif au stade adulte de l'espèce P_3 . On y aurait donc à faire au phénomène de protéro-genèse défini par Schindewolf (1927).

L'analyse du caractère Y dans les séries de l'ontogenèse de nos trois espèces fait constater des relations variables. Chez P_1 ce caractère apparaît dès les stades précoces, mais disparaît chez l'adulte. Chez P_2 il est limité aux stades les plus précoces pour être remplacé ensuite par un caractère nouveau et une distribution différente des éléments morphologiques. On y a à faire au phénomène de déviation, quoique sous une forme non typique.

Le caractère Z correspond à un élément morphologique qui subit une rapide modification et est différemment exprimé à l'état adulte dans chaque espèce. Dans notre schéma (tabl. 2) ce caractère n'est signalé que là où il se présente sous sa forme typique. Chez P_3 ce caractère présente un aspect particulier, ce qui rend incertaine son interprétation. Il semble qu'on a à faire là au phénomène de déviation lié à celui de prolongation.

Conclusions

Les observations signalées plus haut concernant l'ontogenèse des Ostracodes fossiles conduisent aux conclusions suivantes:

1. L'ontogenèse constitue la source des modifications phylogénétiques.
2. Les modifications peuvent être introduites dans tous les stades de l'ontogenèse.
3. Les caractères ancestraux sont récapitulés quand l'évolution se produit par voie de prolongation.
4. Les caractères palingénétiques de valeur secondaire, propres aux unités taxonomiques inférieures, ne sont pas persistants.
5. Pendant l'ontogenèse de la carapace des Ostracodes, les modifications peuvent se produire tant par voie de protéro-genèse que par celles de prolongation ou de déviation.
6. Le nombre de stades ontogénétiques (la durée de l'ontogenèse), dans les limites de petites unités taxonomiques, ne subit pas de changement.

Laboratoire de Paléozoologie
de l'Université de Varsovie
Warszawa, mai 1959

BIBLIOGRAPHIE

- ADAMCZAK, F. 1956. Polyzygia Gürich, an Ostracod genus from the Givetian of the Holy Cross Mountain (Rodzaj Polyzygia Gürich (Ostracoda) z żywetu Skali w Górach Świętokrzyskich). — *Acta Palaeont. Pol.*, **1**, 1, 35-48, Warszawa.
- 1958. The ontogeny and evolution of Kozłowskiella (Přibyl), Ostracoda (Ontogeneza i ewolucja rodzaju Kozłowskiella (Přibyl), Ostracoda). — *Ibidem*, **3**, 2, 75-118.
- BEER, S. R. de. 1954. Embryos and ancestors. 1-159, Oxford.
- COOPER, CH. L. 1945. Molt stages of the Pennsylvanian ostracode Ectodemites plummeri. — *J. Paleont.*, **19**, 4, 368-375, Menasha.
- EGOROV, V. G. 1950. Ostrakody franskogo jarusa Russkoj Platformy, I Kloedenellidae. — *Mosk. Fil. VNIGRI*, 1-175, Moskva-Leningrad.
- FRANZ, V. 1931. Systematik und Phylogenie der Wirbeltiere. In Bolk, Goppert, Kallius, Lubosch: Handbuch der vergleichenden Anatomie, Wirbeltiere 1.
- HESSLAND, I. 1949. Investigations of the Lower Ordovician of the Siljan district, Sweden. I: Lower Ordovician ostracods of the Siljan district. — *Bull. Geol. Inst. Univ. Uppsala*, **33**, 97-408, Uppsala.
- KELLETT, B. 1933. Ostracodes of the Upper Pennsylvanian and the Lower Permian strata of Kansas. I: The Aparchitidae, Beyrichiidae, Glyptopleuridae, Kloedenellidae, Kirkyidae and Youngiellidae. — *J. Paleont.*, **7**, 1, 59-103, Menasha.
- KESLING, R. V. 1951. Mechanical solution of formulas for growth rates. — *Contr. Mus. Paleont. Univ. Michigan*, **8**, 10, 231-237, Ann Arbor.
- 1952a. A study of Ctenoloculina cicatricosa (Warthin). — *Ibidem*, **9**, 3, 247-290.
- 1952b. Doubling in size of ostracod carapaces in each molt stages. — *J. Paleont.*, **26**, 5, 772-780, Menasha.

- KESLING, R. V. 1953. A beyrichiid ostracod from the Middle Devonian Wanakah shale of western New York. — *Bull. Buff. Soc. Nat. Sci.*, **21**, 2, 19-24, Buffalo.
- KESLING, R. V. & SORONEN, G. C. 1957. The Ontogeny and Ecology of *Welleria aftonensis* Warthin, a Middle Devonian ostracod from the Gravel Point Formation of Michigan. — *Contr. Mus. Paleont. Univ. Michigan*, **14**, 5, 41-55, Ann Arbor.
- KRÖMMELBEIN, K. 1953. Ostracoden-Studien im Devon der Eifel. 3. Nachweis der polnischen Gattungen *Polyzygia* und *Poloniella* im Mittel-Devon der Eifel. — *Senckenbergiana*, **34**, 1/3, 53-59, Frankfurt a. M.
- KRYZANOVSKY, S. G. 1939. Das Rekapitulationsprinzip. — *Acta Zool.*, **20**, 1-89, Stockholm.
- MALZ, H. 1956. Zur ontogenetischen Entwicklung des Schlosses bei Macrodentina-Arten (Ostracoden). — *Senckenberg. Lethaea*, **37**, 535-541, Frankfurt a. M.
- MARTINSSON, A. 1956. Ontogeny and development of dimorphism in some Silurian ostracodes. A study on the Mulde marl fauna of Gotland. — *Bull. Geol. Inst. Univ. Uppsala*, **37**, 14, 1-33, Uppsala.
- MÜLLER, G. W. 1894. Die Ostracoden des Golfes von Neapel und der angrenzenden Meeresabschnitte. — *Fauna und Flora des Golfes von Neapel, Monogr.* **21**, 1-404, Berlin.
- NAEF, A. 1931. Phylogenie der Tiere. — *Handb. Vererbungswiss.*, **13**, 3, 1, 1-200, Berlin.
- REMANE, A. 1952. Die Grundlagen des natürlichen Systems, der vergleichenden Anatomie und der Phylogenetik. 1-400, Leipzig.
- SCHINDEWOLF, O. H. 1929. Ontogenie und Phylogenie. — *Palaeont. Ztschr.*, **11**, 1, 54-67, Berlin.
- 1950. Grundfragen der Palaeontologie. 1-506, Stuttgart.
- SCOTT, H. W. 1951. Instars and shell morphology of *Eoleperditia fabulites*. — *J. Paleont.*, **25**, 3, 321-326, Menasha.
- SEVERCOV (SEVERTZOFF), A. N. 1949. Morfologičeskie zakonomernosti evolucii. — *Izd. Akad. Nauk SSSR*, **5**, 1-536, Moskva-Leningrad.
- SOHN, I. G. 1950. Growth stages in fossil ostracodes. — *Amer. J. Sci.*, **248**, 427-434, New Haven.
- SPJELDNAES, N. 1951. Ontogeny of *Beyrichia jonesi* Boll. — *J. Paleont.*, **25**, 6, 745-755, Menasha.
- ULRICH, E. O. & BASSLER, R. S. 1923. Paleozoic Ostracoda, their morphology, classification and occurrence. — *Maryland Geol. Surv.*, Silurian vol., 271-391, Baltimore.
- VERWORN, M. 1887. Zur Entwicklungsgeschichte der Beyrichien. — *Ztschr. deutsch. geol. Ges.*, **39**, 27-31, Berlin.

FRANCISZEK ADAMCZAK

O PEWNYCH MODYFIKACJACH W ROZWOJU ONTOGENETYCZNYM
DEWOŃSKICH OSTRACODA

Streszczenie

Rozwój indywidualny zwierzęcia jest ważnym procesem dla poznania jego filogenezy. Z punktu widzenia ewolucji badania zmian zachodzących w ontogenezie ma duże znaczenie. Dotyczy to szczególnie wzajemnych stosunków pokrewieństwa form

oraz zagadnienia, „kiedy i jak” pojawiają się nowe cechy w szeregu rozwojowym gatunków.

W niniejszej notatce przedstawiono obserwacje nad ontogenezą 9 gatunków, należących do dwóch rodzajów Ostracoda. Wyniki badań nad jednym z rodzajów — *Kozłowskiella* (Příbyl, 1953) były już opublikowane (Adamczak, 1958), a w tej pracy zostały one częściowo uzupełnione. Wyniki badań nad ontogenezą gatunków rodzaju *Poloniella* Gürich, 1896 (= *Dizygopleura* Ulrich & Bassler, 1923) nie były dotychczas publikowane.

Analizując rozwój osobniczy (fazy wzrostu) badanych gatunków zaobserwowano, że nowe cechy mogą pojawiać się w różnych stadiach wzrostu. Stwierdzono, że ujawniają się one na drodze:

- 1) *proterogenezy*, i wtedy antycypują przyszły rozwój (Schindewolf, 1927, 1950);
- 2) zmiany w końcowych stadiach rozwoju, tj. *prolongacji* — według Franza (1927, 1931), lub *anabolii* — według Siewiercowa (1931);
- 3) *dewiacji* (Franz, Siewiercow), tzn. zmiany lub odchylenia przebiegu ontogenezy we wczesnych stadiach okresu post-embrionalnego; zmiany te nie antycypują przyszłego rozwoju.

Niezależnie od sposobów (*modi*) zmian, czas trwania ontogenezy (liczba stadiów) nie przedłuża się i nie ulega skróceniu w obrębie mniejszych jednostek taksonomicznych (np. rodzaju). Następuje tu tylko przemieszczenie (substytucja) i, kosztem zgęszczenia pewnych cech w procesie ontogenezy, powstanie cech nowych. W ewolucji, która urzeczywistnia się sposobem prolongacji, istnieje duża możliwość odtworzenia szeregu przodków. Rekapitulowane w procesie rozwoju osobniczego cechy przodków (drobne cechy palingenetyczne) mają charakter przejściowy i podlegają takim samym prawom wzrostu i rozwoju, jak inne cechy zwierzęcia. Cechy przodków i analogiczne cechy rekapitulowane w ontogenezie potomków nie są identyczne.

Zasadnicze znaczenie w tych badaniach ma metoda ontogenetyczno-porównawcza w odniesieniu do gatunków spokrewnionych ze sobą i zastępujących się w czasie. Zastosowując tę metodę można było ustalić sposoby zmian oraz względne tempo rozwoju niektórych cech.

OBJAŚNIENIA DO ILUSTRACJI

Fig. 1 (p. 198)

Kozłowskiella praeturberculata Adamczak; lewa skorupka formy młodocianej: S_1 bruzda przednia, L_2 płat środkowy, S_2 bruzda medialna, L_3 płat tylny, t guzki, $v. r.$ listwa welarna; $\times 40$.

Fig. 2 (p. 200)

Poloniella tertia Krömmelbein; lewa skorupka samicy: L_1 — L_4 płaty — przedni, środkowy, tylny i ostatni, S_1 — S_3 bruzdy — przednia, medialna i tylna; $\times 61$.

Pl. I

- Fig. 1. *Kozłowskiella praetuberculata* Adamczak: a lewa skorupka samicy, b lewa skorupka samca, $\times 23$.
 Fig. 2. *Poloniella tertia* Krömmelbein: a lewa skorupka samicy; $\times 46$; b lewa skorupka samca, $\times 53$.
 Fig. 3. *Poloniella devonica* Gürich: a lewa skorupka samicy, $\times 51$; b lewa skorupka samca, $\times 52$.
 Fig. 4. *Poloniella kielanae* Přibyl: a lewa skorupka samicy, $\times 53$; b lewa skorupka samca, $\times 54$.

ФРАНЦИШЕК АДАМЧАК

О НЕКОТОРЫХ МОДИФИКАЦИЯХ В ОНТОГЕНИЧЕСКОМ РАЗВИТИИ ДЕВОНСКИХ ОСТРАКОД

Резюме

С точки зрения эволюционного учения большое значение имеет исследование изменений, происходящих в онтогенезе. Индивидуальное развитие животных является важным источником данных по филогенезам. Это касается особенно родственных взаимоотношений между отдельными формами и вопроса „когда и каким образом” появляются новые признаки в филогенетических рядах видов.

В настоящей заметке представлены наблюдения над онтогенезом девяти видов, принадлежащих к двум родам остракод. Результаты исследований над родом *Kozłowskiella* (Přibyl, 1953) были уже опубликованы (Adamczak, 1958), а в настоящей статье приведены лишь дополнительные данные. Онтогенез видов рода *Poloniella* Gürich, 1896 (= *Dizygopleura* Ulrich & Bassler, 1923) до сих пор не был описан.

Проводя анализ индивидуального развития (фаз роста) исследованных видов можно заметить, что новые признаки появляются на разных стадиях роста. Установлено, что они могут возникать путем:

1) **протерогенеза**, и определяют тогда дальнейший ход развития (Schindewolf, 1927, 1950),

2) изменения в последних стадиях развития, т. е. **пролонгации** — согласно Францу (1927, 1931), или **анаболии** — согласно Северцову (1931),

3) **девиации** (Франц, Северцов), т. е. изменения или отклонения в ходе онтогенеза на ранних стадиях пост-эмбрионального развития; эти изменения не определяют хода дальнейшего развития.

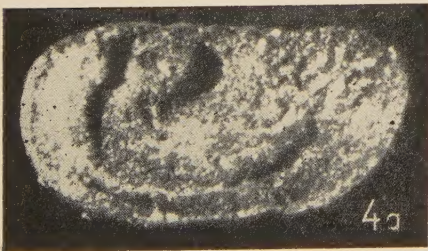
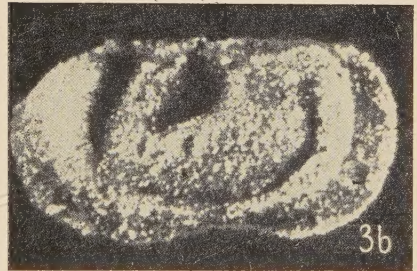
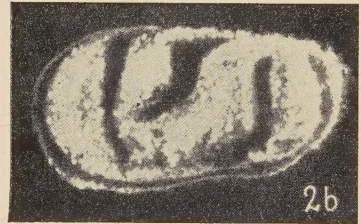
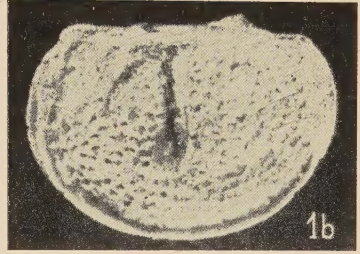
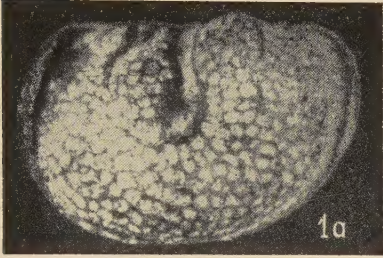
Несмотря на то, каким образом происходят изменения, продолжительность онтогенеза (число стадий) в небольших таксономических единицах (например в родах) не подвергается увеличению или сокращению. Происходит тут только перемещение (субституция) и „сгущение” некоторых признаков в онтогенезе

вследствие появления новых особенностей. В случаях эволюции осуществляющейся путем пролонгации имеется большая возможность реконструкции ряда предков. Признаки предков повторяемые в индивидуальном развитии (мелкие палингенетические признаки) имеют временный характер и подчиняются правилам роста и развития также как и другие признаки. Признаки предков и соответствующие им рекапитулированные в онтогенезе потомками — не идентичны.

Основным методом в такого рода исследованиях является сравнительно-онтогенетический, примененный к родственным и сменяющим друг друга во времени видам. Благодаря этому методу можно было выяснить ход изменений и определить относительный темп развития некоторых признаков.

Pl. I

- Fig. 1. *Kozlowskiella praetuberculata* Adamczak: *a* carapace gauche de la femelle, *b* carapace gauche du mâle, $\times 23$.
- Fig. 2. *Poloniella tertia* Krömmelbein: *c* carapace gauche de la femelle, $\times 46$; *b* carapace gauche du mâle, $\times 53$.
- Fig. 3. *Poloniella devonica* Gürich: *a* carapace gauche de la femelle, $\times 51$; *b* carapace gauche du mâle, $\times 52$.
- Fig. 4. *Poloniella kielanae* Přibyl: *a* carapace gauche de la femelle, $\times 53$; *b* carapace gauche du mâle; $\times 54$.



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